

GENESIS SOLAR ENERGY PROJECT

APPLICATION FOR REPORT OF WASTE DISCHARGE / JOINT TECHNICAL DOCUMENT

Submitted to:
California Regional Water Quality Control Board
Colorado River Basin Region

Submitted by:
Genesis Solar, LLC

With technical assistance from:

WorleyParsons Group, Inc.

August 2009

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Date

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Date

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Bob Anders, PE

Date

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LIST OF ACRNOYMS

ACEC	Area of Critical Environmental Concern
AFC	Application for Certification
afpy	Acre feet per year
ALR	Action Leakage Rate
ASTM	American Society for Testing and Materials
bgs	Below ground surface
BLM	Bureau of Land Management
BMP	Best Management Practice
CCR	California Code of Regulations
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
COC	Cycles of Concentration
CQA	Construction Quality Assurance
CRBRWQCB	Colorado River Basin Regional Water Quality Control Board
CSP	Concentrated Solar Power
DESCP	Drainage, Erosion and Sediment Control Plan
DTSC	Department of Toxic Substances Control
ECM	Environmental Compliance Manager
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
°F	Degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FSA	Final Staff Assessment
GCL	Geosynthetic Clay Liner
gpm	Gallons per minute (rate)
HDPE	High Density Polyethylene
HTF	Heat Transfer Fluid
JTD	Joint Technical Document
LDRS	Leak Detection and Removal System
LEA	Local Environmental Agency
LTU	Land Treatment Unit
mgd	Million gallons per day (rate)
mg/kg	milli grams per kilo gram
mg/L	milli grams per liter

MMF	Multi Media Filter
MSDS	Material Safety Data Sheet
MW	Megawatt
NOAA	National Oceanic and Atmospheric Administration
PGA	Peak Ground Acceleration
PPE	Personal Protective Equipment
ppm	Parts per million
PSA	Preliminary Staff Assessment
QA/QC	Quality Assurance / Quality Control
RCC	Roller Compacted Concrete
RLLC	Rapid Large Leakage Rate
RO	Reverse Osmosis
ROWD	Report of Waste Discharge
RQ	Reportable Quantity
SEGS	Solar Energy Generating Systems
SPCC	Spill Prevention Control and Countermeasures
SSG	Solar Steam Generator
STG	Steam Turbine Generator
STLC	Soluble Threshold Limit Concentrations
SWPPP	Storm Water Pollution Prevention Plan
TCLP	Toxic Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TTLC	Total Threshold Limit Concentrations
WDR	Waste Discharge Requirement
WET	Waste Extraction Test

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NA = NOT APPLICABLE TO THIS PROJECT

1. APPLICATION FORM

DRAFT



APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

**I. FACILITY INFORMATION****A. Facility:**

Name: GENESIS SOLAR ENERGY PROJECT			
Address:			
City: BLYTHE	County: RIVERSIDE	State: CA	Zip Code: 92225
Contact Person:		Telephone Number:	

B. Facility Owner:

Name: GENESIS SOLAR LLC			Owner Type (Check One) 1. <input type="checkbox"/> Individual 2. <input type="checkbox"/> Corporation	
Address: 700 UNIVERSE BLVD, FED/JB			3. <input type="checkbox"/> Governmental Agency 4. <input type="checkbox"/> Partnership	
City: JUNO BEACH	State: FL	Zip Code: 33408	5. <input checked="" type="checkbox"/> Other: <u>LLC</u>	
Contact Person: MEG RUSSELL		Telephone Number: 561-304-5609	Federal Tax ID: 35-2303285	

C. Facility Operator (The agency or business, not the person):

Name: SAME AS OWNER			Operator Type (Check One) 1. <input type="checkbox"/> Individual 2. <input type="checkbox"/> Corporation	
Address:			3. <input type="checkbox"/> Governmental Agency 4. <input type="checkbox"/> Partnership	
City:	State:	Zip Code:	5. <input type="checkbox"/> Other: _____	
Contact Person:		Telephone Number:		

D. Owner of the Land:

Name: BUREAU OF LAND MANAGEMENT			Owner Type (Check One) 1. <input type="checkbox"/> Individual 2. <input type="checkbox"/> Corporation	
Address: 600 WEST GARNET AVE			3. <input checked="" type="checkbox"/> Governmental Agency 4. <input type="checkbox"/> Partnership	
City: NORTH PALM SPRINGS	State: CA	Zip Code: 92258	5. <input type="checkbox"/> Other: _____	
Contact Person: ALLISON SCHAEFER		Telephone Number: 760-833-7104		

E. Address Where Legal Notice May Be Served:

Address: SAME AS OWNER		
City:	State:	Zip Code:
Contact Person:		Telephone Number:

F. Billing Address:

Address: SAME AS OWNER		
City:	State:	Zip Code:
Contact Person:		Telephone Number:



APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT



II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application (A or B):

☒ **A. WASTE DISCHARGE TO LAND**

☐ **B. WASTE DISCHARGE TO SURFACE WATER**

Check all that apply:

- ☐ Domestic/Municipal Wastewater Treatment and Disposal
- ☒ Cooling Water
- ☐ Mining
- ☒ Waste Pile
- ☐ Wastewater Reclamation
- ☐ Other, please describe: _____

- ☐ Animal Waste Solids
- ☒ Land Treatment Unit
- ☐ Dredge Material Disposal
- ☒ Surface Impoundment
- ☒ Industrial Process Wastewater

- ☐ Animal or Aquacultural Wastewater
- ☐ Biosolids/Residual
- ☐ Hazardous Waste (see instructions)
- ☐ Landfill (see instructions)
- ☐ Storm Water

III. LOCATION OF THE FACILITY

Describe the physical location of the facility.

1. Assessor's Parcel Number(s)
Facility: 818-200-0004
Discharge Point: 818-200-0004

2. Latitude
Facility: 33.653431
Discharge Point: 33.666983

3. Longitude
Facility: 114.970233
Discharge Point: 114.997333

IV. REASON FOR FILING

- ☒ New Discharge or Facility ☐ Changes in Ownership/Operator (see instructions)
- ☐ Change in Design or Operation ☐ Waste Discharge Requirements Update or NPDES Permit Reissuance
- ☐ Change in Quantity/Type of Discharge ☐ Other: _____

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency: CALIFORNIA ENERGY COMMISSION (CEC)

Has a public agency determined that the proposed project is exempt from CEQA? ☐ Yes ☒ No

If Yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below.

Basis for Exemption/Agency: _____

Has a "Notice of Determination" been filed under CEQA? ☐ Yes ☒ No

If Yes, enclose a copy of the CEQA document, Environmental Impact Report, or Negative Declaration. If no, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents:

☐ EIR ☐ Negative Declaration

PRELIMINARY STAFF ASSESSMENT AND
FINAL STAFF ASSESSMENT

Expected CEQA Completion Date: DEC 2010

CALIFORNIA ENVIRONMENTAL
PROTECTION AGENCYState of California
Regional Water Quality Control BoardAPPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for providing false information, including the possibility of fine and imprisonment."

Print Name: Michael O'Sullivan
Sr. Vice President

Title: _____

Signature: [Signature]

Date: 8/27/09

FOR OFFICE USE ONLY

Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:
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2. INTRODUCTION

2.1 PURPOSE [21720]

Genesis Solar, LLC, (herein “Genesis Solar LLC” or “Applicant”), is proposing to construct, own and operate the Genesis Solar Energy Project (herein “Project”) on approximately an 1,800-acre site near Ford Dry Lake in Riverside County, California (refer **Figure 1**). The Project is a concentrated solar power (CSP) electric generating facility that will use a proven parabolic trough solar thermal technology. The troughs will concentrate the sun's heat on tubes carrying a petroleum-based Heat Transfer Fluid (HTF) that will be used for steam production. The steam in turn will be used to power a steam turbine generator.

Genesis Solar LLC proposes to use evaporation ponds and a land treatment unit (LTU) as part of the Project. The evaporation ponds will receive, store and evaporate wastewater from operations at the Project site. The LTU will receive, temporarily store and treat soil that has been impacted by occasional leaks and spills of HTF.

This application fulfills the regulatory requirements to obtain the needed approvals for these Project components. A cross reference table to the California Code of Regulations (CCR), Title 27, Division 2 requirements for Solid Waste is provided after the Table of Contents within this report.

2.2 PROJECT DESCRIPTION

Genesis Solar, LLC is proposing to develop a 250-megawatt (MW) solar thermal power generating project, using concentrated solar trough technology. There will be two independent 125 MW units on site to provide a total net electrical output of 250 MW (refer to **Section 4.1** for facility overview). Commercial operation is planned to commence July 2014, subject to timing of regulatory approvals and Applicant achievement of project equipment procurement and construction milestones.

The solar thermal technology will provide 100 percent of the power generated by the Project; no supplementary energy source (e.g. natural gas to generate electricity at night) is proposed to be used for electric energy production. The Project will utilize a natural gas fired auxiliary boilers to reduce start up time and for HTF freeze protection. Freeze protection shall maintain HTF at a minimum 100 degrees Fahrenheit [°F]

Genesis Solar LLC proposes to use a wet cooling tower for power plant cooling. Water for cooling tower makeup, process water makeup, and other industrial uses such as mirror washing will be supplied from on-site groundwater wells, which also will be used to supply water for employee use (e.g., drinking, showers, sinks, and toilets). A package water treatment system will be used to treat the water to meet potable standards. A sanitary septic system and on-site leach field will be used to dispose of sanitary wastewater.

Project cooling water blow down from each unit will be piped to lined, on-site evaporation ponds. For safety and operational purposes, accumulated precipitated solids will be removed from the base of the evaporation ponds when they reach a depth of 3 feet. It is estimated that 3 feet of

solids will accumulate approximately every 7 years when using groundwater containing 5,000 mg/l of total dissolved solids (TDS) as a water supply. Dewatered residues from the ponds will be sent to an appropriate off-site landfill for disposal. No off-site backup cooling water supply is planned at this time; the use of multiple on-site water supply wells and redundancy in the well equipment will provide an inherent backup in the event of outages affecting one of the on-site supply wells.

The Project will include a LTU to treat soil contaminated with HTF. The unit will be designed in accordance with Colorado River Basin Regional Water Quality Control Board (CRBRWQCB) requirements.

2.3 CEQA STATEMENT

The California Energy Commission (CEC) is the lead agency under the California Environmental Quality Act (CEQA) for all thermal power plants greater than 50MW (CEC 2008). The CEC's power plant licensing process is a CEQA-equivalent process.

The environmental review documents produced by the CEC Staff are called the Preliminary Staff Assessment (PSA), which is similar to a draft Environmental Impact Report (EIR), and the Final Staff Assessment (FSA) which is like a Final EIR.

The CEC licensing process is a 12-month process, from the point at which the CEC deems the Project Proponent's Application for Certification (AFC) "Data Adequate". The AFC was submitted at the end of August 2009, for data adequacy. An example 12-month schedule for the CEC is provided below. The actual schedule for the Project will be determined by the Committee assigned to the proceeding.

Activity	Day
Applicant Files Application for Certification (AFC)	-46
CEC Executive Director's recommendation on data adequacy	-45
Decision on data adequacy at the business meeting	0
Staff files data requests (round 1)	15
Staff files Issue Identification Report	35
Applicant provides data responses (round 1)	45
Information hearing and site visit	45
Data response and issue resolution workshop (round 1)	55
Staff files data requests (round 2, if necessary)	65
Applicant provides data responses (round 2, if necessary)	95
Data response and issue resolution workshop (round 2)	105
Local, state and federal agency draft determinations	120

Preliminary Staff Assessment filed	150
Preliminary Staff Assessment workshop(s)	170-180
Local, state and federal agency final determinations	180
Final Staff Assessment filed	210
Evidentiary hearings	220-240
Committee files proposed decision	305
Hearing on the proposed decision	320
Addendum/revised proposed decision	350
Commission Decision	365

2.4 APPROVAL REQUIREMENTS [21600(B)(9)]

As outlined in **Section 2.3**, CEC will coordinate reviews and approvals with regulatory agencies to ensure the FSA meets the CEQA requirements. This includes obtaining Waste Discharge Requirements (WDR) from the CRBRWQCB, based on this Joint Technical Document (JTD)/ Report of Waste Discharge (ROWD).

2.5 PUBLIC PARTICIPATION [21730]

As outlined in **Section 2.3**, there will be several workshops which will include public participation. All the documentation from the Applicant, CEC, regulatory agencies and other interested parties will be available to the public through the CEC.

3. PHYSICAL SETTING

3.1 SITE LOCATION [21600(B)(3)(D)]

The Project site will be located in the Colorado Desert in Chuckwalla Valley between the communities of Blythe, CA (approximately 24 miles east) and Desert Center, CA (approximately 27 miles west) (refer **Figure 1**). A new access road to the Project site is proposed, from Wiley's well rest area on Interstate 10 (I-10). Ford Dry Lake is located approximately 1 mile south west of the Project site.

3.2 LAND USE [21600(B)(3)(E), 21750(H)]

The Project site is located in Township 6S, Range 19E San Bernardino Base and Meridian. The Project site covers approximately 1,800 acres of Federal land managed by the Bureau of Land Management (BLM). Surrounding land uses to the Site include I-10 to the south, the Palen McCoy Wilderness to the north, the Palen Dry Lake Area of Critical Environmental Concern (ACEC) to the west and open (unrestricted access) lands to the east (refer to **Figure 2**).

Most of the land near the Project site is managed by BLM and there is no California State Land in the vicinity, but there are substantial private holdings.

3.3 SOIL CONTAMINATION

A Phase I Environmental Site Assessment was conducted between November 2008 and July 2009 (Tetra Tech 2009). There was no evidence of any hazardous wastes and substances, storage tanks or solid waste accumulations, therefore soil contamination is not expected at the site.

3.4 TOPOGRAPHY [21750(D)(1)]

The general topography in this desert terrain consists of mountain ranges surrounded by extensive alluvial fans coalesced into bajadas that slope toward the topographic low-points of the valley, Ford Dry Lake and Palen Lake (refer **Figure 1**). The Project site is situated within the Chuckwalla Valley and is relatively flat. The Project site generally slopes from north to south with elevations of approximately 400 to 370 feet above mean sea level (refer **Figure 3**).

3.5 FLOODPLAIN [21750(D)(2)]

The Site is within "RIVERSIDE COUNTY AND INCORPORATED AREAS" within Federal Emergency Management Agency (FEMA); however there are no flood insurance maps provided for this area. The Site is not located in a flood hazard area identified in the Riverside County General Plan Safety Element.

There are no perennial streams in Chuckwalla Valley and a vast majority of the time, the area is dry and devoid of any surface flow anywhere. Water runoff occurs only in response to infrequent intense rain storms. Much of the area is subject to inundation either by sheet flow or flow confined to an expansive network of ephemeral washes, Palen and Ford Dry Lakes, and other local topographic low-points. The entire area drains first to these two dry lakes, and then to evaporation or groundwater.

3.6 CLIMATOLOGY [21750(E)]

The Project is located in an arid desert climate, therefore has extreme daily temperature changes, low annual precipitation, strong seasonal winds and mostly clear skies. Evaporation rates are higher than precipitation rates.

Based on 60 years of data from Blythe Airport, the mean maximum temperatures in June to September exceed 100°F. Winter months are more moderate with mean maximum temperatures of high 60's to low 70's °F and minimums temperatures in the low to mid 40's °F. Although there are no average minimal temperatures below freezing point (32°F), the temperature has historically dropped below freezing point between November and March. **Table 1** shows the Site Climate Data, based on information from Blythe Airport, Ford Dry Lake and Yuma, Arizona.

Average annual evaporation in the Project area, based on published data at the Indio Fire Station 70 miles west of the Project site, is 105 inches, of which 87 percent of that evaporation occurs between March and October.

Average annual precipitation in the Project area, based on the gauging station at Blythe Airport, is 3.55 inches, with August recording the highest monthly average of 0.63 inches and June recording the lowest monthly average of 0.02 inches (refer **Table 2**). Per the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 for the Southern California area, 3.51 inches of rainfall shall fall in the 100 year, 24 hour storm event.

The design capacity of the evaporation ponds is based on containment of the 100-year 24-hour storm event. An isohyetal map was not available due to the lack of sufficient monitoring stations within a 10 mile radius of the Project, however the NOAA Atlas 14 is provided as **Figure 4**.

The predominant winds in the Project area are shown on **Figure 5** (Annual Blythe ASOS Wind Rose). Winds in the Project region are generally south southwest with a less frequent component of northerly winds (north through northwest). Calm conditions occur approximately 16.43% of the time, with the annual average wind speed being approximately 7.62 miles per hour (mph) (3.41 m/s) (Genesis Solar Energy Project, AFC Section 5.2 Air Quality).

3.7 GEOLOGY AND SEISMICITY [21750(F)]

The region has undergone a complex geologic history that includes sedimentation, volcanic activity, folding, faulting, uplift and erosion (refer Genesis Solar Energy Project, AFC Section 5.5 Geological Hazards). **Figure 6** contains a map of the geological units in the Project area. The Project area is underlain by Holocene to Miocene basin fill deposits (Stone, 2006). These

deposits include younger alluvium, older (Pleistocene) alluvium, the Pliocene Bouse Formation and the Miocene fanglomerate. The uppermost alluvium in the basin consists of Holocene to Pleistocene alluvial fan, fluvial, playa, and aeolian (wind blown) deposits. In general, coarser alluvial fan deposits are found near the valley edges and grade into finer distal fan, valley axial (fluvial) and playa deposits near the low points of the basin. Holocene-age playa deposits are found in the Ford Dry Lake area and consist mainly of clay, silt, and sand above the water table (DWR 1963).

The older alluvium (Pleistocene age) consists of fine to coarse sand interbedded with gravel, silt, and clay (DWR 1963). The Pleistocene alluvium likely comprises the most important aquifer in the area (DWR 1963).

The Pliocene-age Bouse Formation is a marine to brackish-water sequence that is composed of a basal limestone overlain by interbedded clay, silt, sand, and tufa. Near the southeastern portion of the basin the Bouse Formation occurs at a depth between approximately 100 to 800 feet below ground surface (bgs) (Wilson and Owens-Joyce 1994).

The fanglomerate lies unconformably below the Bouse Formation and is composed chiefly of angular to subrounded and poorly sorted partially to fully cemented pebbles with a sandy matrix (Metzger 1973). The fanglomerate is likely Miocene age; however, it may in part be Pliocene age (Metzger 1973). Near the southeastern portion of the basin the fanglomerate occurs at a depth between approximately 800 to 5,000 feet bgs (Wilson and Owens-Joyce 1994).

Geologic units near the project area consist of the recent dune sand, recent alluvium, and non-marine sedimentary deposits. The unconsolidated alluvial fan, river channel, and stream deposits consist of silt, sand, clay, and gravel. These also include recent floodplain deposits of the Colorado River including silt, sand, and clay. The nonmarine sedimentary deposits consist of older alluvium and fanglomerate, dissected with well-developed desert pavement and desert varnish in some areas. These consist mostly of clay, siltstone, sand, and gravel.

Seismicity. The Project site lies within the eastern part of Riverside County in a part of California considered not to be very seismically active. Although there are several bedrock faults off site in the mountains surrounding Chuckwalla Valley, these do not exhibit recent activity and are presumed to be Tertiary or pre-Tertiary in age (Stone, 2006). In addition, gravity anomalies suggest the presence of several subsurface faults beneath Chuckwalla Valley in the vicinity of the project area (Stone, 2006; Rotstein, et al., 1976). The gravity anomalies reflect abrupt changes in basement elevation strongly suggestive of dip-slip movements. In addition some of these faults may have undergone right-lateral strike slip movements. These faults are presumed Tertiary and likely inactive with very low chance of earthquakes. The Project site is not located within a State of California Earthquake Fault Zone designated by the Alquist-Priolo Special Studies Zone Act of 1972 (formerly known as a Special Studies Zone), an area where the potential for fault rupture is considered probable.

The active faults considered most likely to produce large earthquakes potentially affecting the Project site are located at a considerable distance to the west and southwest and include the San Andreas, Imperial, and San Jacinto-Anza faults. Other smaller faults are located within approximately 100 kilometers (km) of the Site as summarized in **Table 3**. These faults are believed to be capable of producing ground shaking with peak ground accelerations exceeding 0.10 times the force of gravity (0.10 g).

Seismic Shaking. A preliminary estimate of ground motions expected at the site was prepared using source and attenuation models developed by the USGS National Seismic Hazard Mapping Project (NSHMP, 2009). For design of important facility structures, a site-specific Probabilistic Seismic Hazard Assessment is being completed as part of an ongoing Geotechnical Investigation and will be made available to the CEC. The preliminary results indicate that peak ground acceleration (PGA) with a probability of exceedance of 10 percent in 50 years (475 Year Return Period) is 0.14 g. The deaggregation information indicates that the mean moment magnitude is 6.8 at a mean distance of 68 km. The PGA with a probability of exceedance of 2 percent in 50 years (2475 Year Return Period) is 0.23 g. The mean moment magnitude is 6.7 at a mean distance of 48 km.

Ground Rupture. The Project site is not located within a State of California Earthquake Fault Zone designated by the Alquist-Priolo Special Studies Zone Act of 1972 (formerly known as a Special Studies Zone), an area where the potential for fault rupture is considered probable (Riverside County, 2008). In addition, no Quaternary, Sufficiently Active, or Well Defined Faults are located under or near the Site. Based on this information and engineering judgment, earthquake-induced ground rupture is not considered to be a significant hazard at the Site.

Slope Stability. The Site is not considered to be an area with the potential for permanent ground displacement due to earthquake-induced landslides because surface topography at and near the site is relatively flat (Riverside County, 2008). A review of the Riverside County General Plan, Safety Element, did indicate areas considered susceptible to earthquake induced landslides and rockfalls in the Palen and McCoy Mountains; however, these areas are several miles from the Site and are not expected to impact the Project. Based on this information and engineering judgment, slope instability is not considered to be a significant hazard at the Site.

Erosion. Erosion is the displacement of solids (soil, mud, rock, and other particles) by wind, water, or ice and by downward or down-slope movement in response to gravity. Due to generally flat terrain, the Project site is not prone to significant mass wasting (gravity-driven erosion and non-fluvial sediment transport) at present. The Riverside County General Plan, Safety Element (Riverside County, 2008), indicates the Site is in an area with moderate potential for wind erosion, the off-site linears are in areas with moderate to high potential for wind erosion. Soil characteristics at the Project site allow for the potential for wind and water erosion, and significant sediment transport currently occurs across the valley axial drainage that crosses the majority of the proposed plant site. As indicated above, these valley axial deposits are characterized by subdued bar and swale topography and ongoing deposition from sheet floods. Limited sand and aeolian erosion also occurs between depositional episodes.

To address the management of sediment transport, erosion and sedimentation during operation, the project design will incorporate diversion berms, channels, detention basins and dispersion structures. The final design for these features will be developed during detailed design, and will include industry-standard calculations and modeling to reduce the potential for erosion or sedimentation, and to reduce the need for ongoing maintenance. Dirt roads and exposed surfaces will be periodically treated with dust palliatives as needed to reduce wind erosion. Construction and maintenance of the proposed drainage and sediment management system at

the Site is expected to reduce water and wind erosion at and downstream of the Site to less than significant levels.

Liquefaction. Liquefaction is a soil condition in which seismically induced ground motion causes an increase in soil water pressure in saturated, loose, uniformly-graded sands, resulting in loss of soil shear strength. As a result, the effects of liquefaction can include loss of bearing strength, differential settlement, ground oscillations, lateral spreading, and flow failures or slumping. Liquefaction occurs primarily in areas where the groundwater table is within approximately 50 feet of the surface (Riverside County, 2008). The Riverside County General Plan Safety Element (Riverside County, 2008) indicates that the majority of Chuckwalla Valley, including the soils beneath the Project site and associated Project off-site linears, is mapped as having deep groundwater but underlain by soils with an otherwise moderate susceptibility to liquefaction. The depth to water beneath the Site is estimated to range from approximately 61 to 94 feet bgs (see Section 5.4 Water Resources of the AFC). In addition, the sandy soils encountered in the upper 100 feet beneath the Project site during geotechnical drilling are generally dense and well graded. Dense, well-graded sands are not generally considered susceptible to liquefaction. Based on this information and engineering judgment, the potential for liquefaction hazard at the Project site is considered to be low. The potential for liquefaction will be further evaluated as part of the Final Geotechnical Investigation for the Project, and if necessary, design parameters to address identified conditions will be incorporated into the detailed project design.

Differential Settlement. Seismically induced settlement can occur during moderate and large earthquakes in soft or loose, natural or fill soils that are located above the ground water table, resulting in differential settlement. The settlement can cause damage to surface and near-surface structures. The most susceptible soils are clean loose granular soils. Due to the expected dense to very dense nature of the near surface soils, the potential for damage due to seismically induced settlement is considered to be low at the Project site. The potential for seismically-induced settlement will be further evaluated as part of the Final Geotechnical Investigation for the Project, and if necessary, design parameters to address identified conditions will be incorporated into the detailed project design.

Collapsible Soil Conditions. Alluvial soils in arid and semi-arid environments can have characteristics that make them prone to collapse with increase in moisture content and without increase in external loads. Soils that are especially susceptible to collapse or hydrocompaction in a desert environment are loose dry sands and silts, and soils that contain a significant fraction of water soluble salts. In the Site vicinity, this would include aeolian sand, playa evaporite deposits, and potential loose flash flood deposits. Based on surface reconnaissance, review of geologic mapping, and review of aerial photographs, although there are aeolian deposits south of the Site near Ford Dry Lake, but no significant aeolian or playa deposits are located within the Site. There do not appear to be near surface evaporite deposits associated with Ford Dry Lake (Stone, 2006). The near surface soils at the Site are composed primarily of alluvial soils which appear to have been deposited in relatively thin sheet flood and fluvial deposits have a low potential for hydrocompaction. Based on this data and engineering judgment, the site soils do not have a significant potential for hydrocompaction or collapse. The potential for hydrocompaction and soil collapse will be further evaluated as part of the Final Geotechnical Investigation for the Project, and if necessary, design parameters to address identified conditions will be incorporated into the detailed project design.

Expansive Soil. Expansive soil is predominantly fine grained and contains clay minerals capable of absorbing water in their crystal structure. It is often found in areas that were historically a flood plain or lake area, but can also be associated with some types of shale, volcanic ash or other deposits, and can occur in hillside areas also. Expansive soil is subject to swelling and shrinkage, varying in proportion to the amount of moisture present in the soil. As water is initially introduced into the soil (by rainfall or watering) expansion takes place. If dried out, the soil will contract, often leaving small fissures or cracks. Excessive drying and wetting of the soil can progressively deteriorate structures that are not designed to resist this effect, and can lead to differential settlement under buildings and other improvements. The surficial soils at the site generally consist of predominantly granular soils that do not contain much clay and are not subject to significant expansion hazards. The potential for expansive soils will be further evaluated as part of the Final Geotechnical Investigation for the Project, and if necessary, design parameters to address identified conditions will be incorporated into the detailed project design.

Based on the above information, the cut and fill slope dimensions and earthwork requirements discussed in subsequent sections will be adequate to address the stability of the evaporation ponds and LTU for the life of the project and no further analysis is warranted.

3.8 HYDROGEOLOGY [21750(G)]

The site is located in the eastern half of the Chuckwalla Valley Groundwater Basin (refer **Figure 7**) which encompasses approximately 605,000 acres. The basin generally trends east-southeast and is bounded by consolidated rocks of the Chuckwalla, Little Chuckwalla, and Mule Mountains on the south, of the Eagle Mountains on the west, and of the Mule and McCoy Mountains on the east. Groundwater flow is directed southward from the basin's boundary with the Cadiz Valley Basin and east-southeastward from its boundary with the Pinto Valley Basin, toward the eastern basin boundary where it flows into the adjacent Palo Verde Mesa Basin. Beneath the Site, groundwater occurs at depths ranging from approximately 70 to 90 feet bgs (approximately 298 to 315 feet amsl) based on site-specific investigation.

There are three water-bearing sedimentary units overly non-water bearing bedrock in the Chuckwalla Valley Groundwater Basin; *Quaternary Alluvium*., *Pliocene Bouse Formation* and *Miocene Fanglomerate* (refer to **Section 3.7**) (DWR, 2004; DWR, 1963). DWR reports the maximum thickness of these deposits as about 1,200 feet in the Chuckwalla Valley Basin (DWR 1979). Gravity studies performed by USGS near the narrows between the McCoy and Mule Mountains on the southeastern portion of the basin suggests the depth to non-water bearing bedrock ranges from approximately 6,500 feet bgs to 1,000 feet bgs (Wilson and Owens-Joyce 1994).

Groundwater quality varies markedly in the basin. The best groundwater quality is located in the western portion of the basin near Desert Center and the worst water quality is located in the southeastern portion of the basin near Ford Dry Lake (Steinemann, 1989). Groundwater to the south and west of Palen Lake is typically sodium chloride to sodium sulfate-chloride in character (DWR 2004). The detected concentrations of TDS in the basin ranges from 274 milligrams per liter (mg/L) to 8,150 mg/L with an average concentration of 2,100 mg/L (Steinemann 1989). Generally, the dissolved-solids concentrations increase moving further downgradient from Desert

Center (to the southeast) and are highest in the central and eastern parts of the basin (Steinemann 1989). In general, the groundwater in the basin has concentrations of sulfate, chloride, fluoride, and dissolved solids too high for domestic use and concentrations of sodium, boron and dissolved solids too high for irrigation use (DWR 1975). Several of the wells sampled in the basin contain high levels of fluoride and boron.

Site-specific investigation indicates the water quality in the study area varies laterally and vertically. Generally, water quality improves vertically with depth and laterally to the south. Vertically, water quality is generally the worst in the alluvium followed by the Bouse Formation and finally by the Fanglomerate. Calculated TDS concentrations from borehole geophysical logging indicate TDS concentrations as high as 30,500 mg/L within finer grained units (silt and clay) in the alluvium decreasing to less than 5,000 mg/L TDS in more transmissive sediments in the Bouse Formation at depths of 800 to 900 feet bgs. Laterally, water quality is generally better south and southeast of the Site within all three water bearing units in the basin. The best water quality in the study area is generally in the vicinity of and south of I-10.

3.9 WATER USE [21750(H)]

There are no existing wells on the site or within one mile of the Project site. Locations of wells in the region are shown on **Figure 7**.

4. FACILITY DESCRIPTION

4.1 FACILITY OVERVIEW [21600(B)(1)(A)]

Name of Facility:	Genesis Solar Energy Project
Type of Facility:	Solar Power Plant
Owner/Operator:	Genesis Solar, LLC
	700 Universe Boulevard
	Juno Beach, FL, 33408

The process to produce 125MW of electrical power in each module is as follows:

- 650 to 800 acres of solar fields containing Parabolic Mirrors to collect the Sun's energy (field is oversized to ensure 125MW can still be generated when there is less sun);
- HTF absorbs the Sun's energy from the mirrors;
- HTF creates Steam in the Solar Steam Generator (SSG);
- Steam drives the Steam Turbine Generator (STG); then STG produces Electrical Power.

To facilitate the power generation, each 125 MW module will contain the following elements (refer **Figure 8**):

- Solar Arrays;
- Wet Cooling area;
- Power Block (161-230 KV substation);
- Evaporation Ponds (24 acres);
- Bioremediation LTU (5 acres); and
- Stormwater Detention Pond.

Further information on the process flow diagram, water supply and waste characterization is provided in **Section 5**.

4.2 SITE PLAN [21600(B)(1)(B)]

Site Plan details have been provided on the following figures:

- **Figure 2** displays the land use in the region;
- **Figure 1 and 3** displays the topography for area; and
- **Figure 8** displays the site layout with the facility infrastructure requirements.

4.3 ANCILIARY FACILITIES [21600(B)(3)(F)]

Ancillary facilities on Project site include access roads, operations and administration buildings, transmission lines, natural gas pipeline and communications line.

The new access road will be two-lane road, with a minimum paved surface width of 24 feet, and will be the primary point of access for the Project.

There will be several buildings on Project site to cater for the administration and operational requirements. The operational buildings will be located within the power block and substations and the administration building will be located adjacent to the solar fields.

The transmission line “tying” the generator to the local transmission system is referred to as the gen-tie line. The proposed gen-tie line from the Project switchyard will terminate at a new interconnection switchyard on the Blythe Energy Centre Julian Hinds Transmission line, currently under construction.

A new 6 mile, 8-inch natural gas pipeline will be constructed to connect the Project to an existing pipeline situated north of I-10.

A communications line will be required for transmission of revenue metering and protective relaying data between the Project and the new interconnection switchyard or to the local area network. This line is proposed to be routed on the gen-tie transmission structures underneath the current carrying conductors wherever possible.

4.4 HOURS OF OPERATION [21600(B)(1)(C)]

Personnel will staff the Facility 24 hours per day/seven days per week. Even when the solar power plant is not operating, personnel will be present as necessary for maintenance, to prepare the plant for startup, and/or for site security.

4.5 SITE LIFE ESTIMATE [21600(B)(3)(C)]

Genesis Solar, LLC anticipates that the Project will have a useful life of at least 30 years, and will seek approvals for at least that period of time.

5. WASTE CLASSIFICATION AND MANAGEMENT [21600(2), 21740, 21760(B)]

Wastewater from several processes within each 125MW Unit will be piped to three 8-acre evaporation ponds (total combined pond top area of 24 acres) for disposal. Therefore there is a total of 48 acres (top pond area) of evaporation ponds on the Project site (refer **Figure 8**). Discharge into the evaporation ponds is derived from three primary and one occasional source:

1. Pre cooling tower water treatment multi media filter (MMF) waste stream;
2. Post cooling tower water treatment MMF waste stream;
3. Post cooling tower water treatment 2nd Stage reverse osmosis (RO) waste stream; and
4. Occasionally, stormwater accumulated in the proposed LTU that will be used to treat soil affected by spills of HTF.

The sources, and processes generating the wastewater stream disposed in the ponds and their relative contributions are outlined in the following sections and shown on **Figure 9**.

5.1 EVAPORATION POND WASTEWATER

Raw water and pre-treated water are used to supply various plant needs, including cooling tower circulating water, solar steam generator makeup water, and various plant service needs. All these water streams eventually discharge into the evaporation ponds as outlined in the following sections.

5.1.1 WATER SUPPLY

Water to supply the project will be derived from a minimum of two new groundwater supply wells located near each unit's power block area. The wells will pump groundwater from the Bouse Formation below a depth of 780 feet bgs. Two wells at each unit's power block will provide redundancy in the event of outages or maintenance.

The average total annual water usage for each 125 MW unit is estimated to be about 822 acre-feet per year (afpy), or 1644 afpy for the Project, which corresponds to an average daily flow rate of about 1000 gallons per minute (gpm). Usage rates will vary during the year and will be higher in the summer months when the peak maximum flow rate (instantaneous daytime maximum rate) could be as high as about 2,013 gpm for each 125 MW power plant, or 4026 gpm for The Project. Equipment sizing will be consistent with peak daily rates to ensure adequate design margin.

As outlined in **Section 3.8**, the Project site is located within the Chuckwalla Valley Groundwater Basin and groundwater provides the only available water resource in Chuckwalla Valley. Test wells were drilled on the Project site and samples collected at 800 feet bgs in June 2009. The samples were analyzed for the key chemistry parameters important for determining the water and wastewater treatment systems, as well as for estimating the concentration of species likely to be in the evaporation ponds (refer **Table 4**).

The TDS concentration of the proposed groundwater supply is 5000 mg/L. The groundwater is not considered a potential source for municipal or domestic water supply under Resolution 88-63 of the State Water Resources Control Board as the TDS exceeds 3000 mg/L

Water is cycled in the cooling tower until the concentration of chemical constituents rises to levels where it becomes unusable and it is blown down as a waste stream. The numbers of cycles undertaken are called cycles of concentration (COC). The number of COC in the cooling tower is limited by the incoming water chemistry and the behavior of chemistry constituents as the concentration increases. Without any pre-treatment of the raw water ("makeup water") from groundwater onsite, the calcium concentration would limit the process to about 5 cycles of concentration due to the potential to form calcite (CaCO_3), and silica would limit the process to 10 cycles of concentration due to the formation of silica (SiO_2) and magnesium silicate. Due to the limitation of these constituents in the process, pre-treatment of the makeup water is required to reduce the quantity of makeup water required.

5.1.2 WASTEWATER DISCHARGE

The combined estimated rate of wastewater discharge into the evaporation ponds is 214 gpm for peak conditions (refer **Figure 9**) and 182 gpm under annual average conditions. The peak flow rates occur in the summer months, between May and August, when solar energy production is at a peak.

Table 5 lists the chemical concentrations of the three primary wastewater streams that are discharged directly or indirectly to the evaporation ponds. Also listed in this table are the expected chemical concentrations in the combined wastewater discharge. Each wastewater stream is discussed in detail below.

5.1.2.1 RAW WATER PRETREATMENT

The pre-treatment design for the Project takes into account the high concentrations of chloride and sodium present in the makeup water to the Project site. As the makeup water has high concentrations of highly-soluble species (e.g., sodium, chloride and sulfate), and relatively low concentrations of low-solubility species (e.g., calcium and magnesium), a MMF and two-stage RO unit was selected for pre-treatment upstream of the cooling tower. The MMF removes solids or particulates from the makeup water that may damage or reduce the efficiency of the RO membranes. In the two-stage RO design, the waste stream from the first-stage RO unit is feed the second-stage RO for additional water recovery and the treated water from both units combine and are stored in the treated water storage tank before use in the cooling tower. The waste stream from the MMF unit is discharged into the on-site evaporation ponds when the MMF system is backwashed and waste stream from the second RO unit is discharged into the wastewater storage tank. As shown in **Figure 9**, estimated rate of wastewater discharge into the evaporation ponds from the pre-treatment MMF unit is 40 gallons per minute (gpm) for peak conditions and 34 gpm under annual average conditions. Both flow rates are an average of the daily expected discharge in the peak and annual average conditions, as the backwash of the MMF may only happen once a day (at a higher flow rate) depending on the residue build up.

A pre-treatment reverse osmosis unit provides the benefit of reducing the concentration of TDS as well as removing most of the calcium and silica from the makeup water, thus allowing the cooling tower COC to increase to 15.

5.1.2.2 WASTEWATER TREATMENT

The modeled water chemistry of the blowdown from the cooling tower after 15 COC indicates that chloride, sodium and sulfate will be the primary species, along with smaller concentrations of scale forming species (i.e., calcium, magnesium and silica) that were not removed during pre-treatment. Therefore post-treatment is needed to recover most of the wastewater for reuse to minimize the quantity of makeup water required, and to minimize the size of the waste management units (evaporation ponds). Post-treatment will consist of an MMF and RO unit, where similar to the pre-treatment process, the MMF will remove solids from the cooling tower blowdown that may damage or reduce the efficiency of the RO membranes. Treated water through the RO units will be returned to the cooling tower for recycling, and the waste stream from the MMF and second RO unit will be discharged into onsite evaporation ponds.

The estimated rate of wastewater discharge into the evaporation ponds from the post-treatment MMF unit is 13 gpm for peak conditions (refer **Figure 9**) and 11 gpm under annual average conditions. Similar to the pre-treatment MMF system, this discharge will occur only when the MMF system is backwashed to remove the build up of residue.

The estimated rate of wastewater discharge into the evaporation ponds from the post-treatment RO unit is 161 gpm for peak conditions (refer **Figure 9**) and 137 gpm under annual average conditions.

5.1.2.4 LAND TREATMENT UNIT RUN OFF

Stormwater may occasionally accumulate in the LTU used to treat HTF-affected soil at the Project site. This storm water would be pumped to the evaporation ponds only after visual observation to establish that the water is free from HTF product and sheen. Based on conditions at similar sites, it is anticipated that such discharge, if necessary, would only occur approximately once every three to five years.

5.1.2.5 MISCELLANEOUS PLANT DRAINS

Plant drains will occasionally discharge wastewater to the circulating water system. This discharge will contain water from component wash down and cleaning, potential miscellaneous leaks and draining of plant equipment, condensation from plant equipment and other sources. Water from these areas will be collected in a system of floor drains, sumps, and pipes and routed to the wastewater collection system. This water will be routed through an oil-water separator to capture potential oil and prevent it from reaching the circulating water system.

5.1.2.6 CHEMICAL ADDITIVES

Circulating Water in the cooling tower will be modified with chemical treatment to prevent the growth of bacteria, the formation of scale and the minimization of corrosion of the Cooling Tower fill and the condenser tubes. These chemicals include a biocide, a pH control solution, a scale inhibitor and corrosion inhibitor (refer **Table 6**):

- **Biocide:** An open recirculating cooling system provides a favorable environment for biological growth. If this growth is not controlled, severe biological fouling and accelerated corrosion can occur. Sodium hypochlorite is the most common chemical used for controlling the biological growth, slime and algae. Sodium hypochlorite is used because it is safer to handle and less likely to precipitate than other chlorine or bromine compounds. Sodium hypochlorite may be continuously fed at lower concentrations (e.g., 0.1-0.2 ppm), or may be dosed in higher concentrations (e.g., 1.0 ppm) for short periods a few times each day.
- **pH Control:** With the increase in cycles of concentration, the pH typically increases. Many species have reverse solubility (i.e., they tend to precipitate as the pH increases). To control the scale formation of these species, an acid such as hydrochloric acid or sulfuric acid is added. Lowering pH through acid feed not only reduces the scaling tendencies of calcium carbonate, but many other pH-sensitive species that can precipitate on heat-transfer surfaces and reduce heat-transfer capability.
- **Scale Inhibitors:** Anti-scalants are surface-active materials that interfere with the precipitation reactions by either threshold inhibition, crystal modification or dispersion. This enables higher cooling water cycles of concentration and permits operation at "supersaturated" conditions.
- **Corrosion Inhibitors:** Corrosion inhibitors may be added to the circulating water to reduce the rate of corrosion of metals or alloys in contact with the water. Circulating water can range from scale-forming to scale-dissolving (corrosive). Changes in the pH and the cycles of concentration can impact whether or not scale will form and to what extent the water will be corrosive. Corrosion inhibitors such as phosphate and zinc may be added to help reduce corrosion rates.

There are also chemicals added to the MMF system to act as a coagulant / flocculants as well as an anti-scalent (refer **Table 6**).

5.1.3 EVAPORATION RESIDUE

During the 30-year operating life of the Facility, it is estimated that up to 13 ft of sludge may accumulate in the bottoms of the evaporation ponds that consists of precipitated solids from the evaporated wastewater. For operational and safety purposes, the ponds will be cleaned when 3 feet of precipitated solids are accumulated in the base of the ponds, which is estimated to be every 7 years when using groundwater with a TDS of 5,000 mg/L. Approximately 7,150 tons of evaporative residue will be accumulated yearly, which equates to approximately 50,000 tons of evaporative residue being removed during each cleanout. The total amount of accumulated sludge is estimated to be approximately 215,000 tons over 30 years. The predicted chemical

makeup of the sludge, based on information about the raw water chemistry and knowledge of the water use and treatment processes at the Facility, is summarized in **Table 7**.

5.2 LAND TREATMENT UNIT AND HEAT TRANSFER FLUID IMPACTED SOILS

The LTU will be used to treat HTF-affected soil at various concentrations. HTF (Therminol VP-1 or equivalent) is an oil that consists of a mixture of biphenyl and diphenyl oxide that is solid at temperatures below 54 degrees Fahrenheit, is relatively insoluble in water (solubility of approximately 25 milligrams per liter), combustible, and has relatively low volatility (Solutia, 2006) (refer **Appendix A**). The components of HTF are reported to biodegrade relatively rapidly in the environment, have slight toxicity to tested terrestrial species, higher toxicity to tested aquatic species, and a potential to bio-accumulate (IPCS, 1999; JECFA, 2003; SOCMA Biphenyl Working Group, 2003).

A process flow diagram showing the management and treatment of the HTF-affected soil is presented in **Figure 10**. Spills of HTF will be cleaned up within 48 hours and affected soil will be moved to a staging area in the LTU where it will be placed on plastic sheeting pending receipt of analytical results and characterization of the waste material. Samples of excavated HTF-affected soil will be collected in accordance with the Environmental Protection Agency's (EPA's) current version of the manual – "Test Methods for Evaluating Solid Waste" (SW-846) and the waste material characterized in accordance with State and Federal requirements (refer to **Section 5.3.3**).

If the soil is characterized as a hazardous waste, the impacted soils will be transported from the site by a licensed hazardous waste hauler for disposal at a licensed hazardous waste landfill. No HTF-impacted soils characterized as hazardous waste will be disposed or treated on site. Based on past experience (refer **Section 5.3.3**), it is anticipated that soil containing 10,000 milligrams per kilogram (mg/kg) HTF or more will be managed as hazardous waste, and that soil containing less than 10,000 mg/kg HTF will be a non-hazardous waste and managed at the Project site. If the soil is characterized as a non-hazardous waste, it will be spread in the LTU for bioremediation treatment. In general, more highly contaminated soil will be covered with plastic sheeting to prevent contact with stormwater and to control potential odors and emissions, as well as for moisture and temperature retention. Once the soil has been treated to a concentration of less than 100 mg/kg HTF, it will be moved from the LTU to another portion of the site until it is reused at the facility as fill material.

Based on available operation data from other sites, it is anticipated that approximately 750 cubic yards (on average) of HTF-affected soil may be treated per year. Larger or smaller quantities could be generated during some years, depending on the frequency and size of leaks and spills.

A spill prevention, control and countermeasure (SPCC) plan will be undertaken for this site. The SPCC will include:

- Secondary containment around the tanks storing HTF, capable of containing the 110% of the storage tank capacity and/or sufficient freeboard to contain precipitation from a 25-year, 24-hour storm event.

- It is not practicable to provide secondary containment around HTF product t piping, therefore will have daily inspections of all infrastructure containing HTF.
- If leaks are identified, the affected area will be isolated and spills cleaned up within 48 hours.

5.3 WASTE CLASSIFICATION [20210]

5.3.1 WASTEWATER

Table 4 shows the concentrations of chemical constituents in the wastewater discharge compared to Soluble Threshold Limit Concentrations (STLCs) as reported in the CCR, Title 22, Chapter 11, Division 4.5, Article 3, Section 66261.24 “Characteristics of Toxicity”, and compared to Toxicity Characteristic Leaching Procedure (TCLP) values as reported in the Code of Federal Regulations (CFR) Part 261, Section 261.24.

The concentration of chemical constituents in wastewater discharging into the evaporation ponds is less than the STLC and TCLP for all reported parameters; therefore, the wastewater is not considered a hazardous waste under State or Federal regulations.

The California Water Code Section 13173 defines a designated waste as:

- a) Hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to Section 25143 of the Health and Safety Code; or
- b) Nonhazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives, or that could reasonably be expected to affect beneficial uses of the waters of the state as contained in the appropriate state water quality control plan.

The wastewater discharging into the evaporation ponds is non hazardous; however, it does contain pollutants which could exceed water quality objectives if released, or that could be expected to affect the beneficial uses of waters of the state. Therefore, the wastewater is classified as a “designated waste.” This classification is consistent with CCR Title 27, Chapter 3, Subchapter 2, Article 2 Section 20210.

5.3.2 EVAPORATION RESIDUE

Table 7 shows the total concentrations of chemical constituents expected in the evaporation residue that will accumulate in the ponds during operation compare to their respective STLCs and Total Threshold Limit Concentrations (TTLCs) as reported in the CCR, Title 22, Chapter 11, Division 4.5, Article 3, Section 66261.24 “Characteristics of Toxicity”. **Table 7** also includes the TCLP as reported under CFR Part 261 Section 261.24.

The predicted concentrations of chemical constituents in the evaporation residue in the ponds are less than the TTLC for all reported parameters. The predicted concentrations of chemical

constituents in the evaporation residue in the ponds is also less than 10 times the STLC for reported parameters; therefore, further analysis of the residue using the Waste Extraction Test (WET) would not be required and the waste may be classified as non-hazardous under CCR Title 22, Division 4.5. In addition, the total concentrations of chemical constituents in the evaporation residue in the ponds is less than the TCLP for all reported parameters; therefore, further analysis of the residue using the TCLP method would not be required and the waste may be considered a non-hazardous waste under federal regulations. Testing of this material will be conducted as part of the facility monitoring program (**Section 10**) to verify this characterization. The evaporation residue accumulated in the ponds is non hazardous; however, it does contain pollutants which could exceed water quality objectives if released, or that could be expected to affect the beneficial uses of waters of the state. Therefore, the evaporation residue is classified as a “designated waste.” This classification is consistent with CCR Title 27, Chapter 3, Subchapter 2, Article 2 Section 20210.

5.3.3 LAND TREATMENT UNIT

Classification of waste for HTF-impacted soils can only be undertaken once the Project is operational. As outlined in **Section 5.2**, samples will be taken from HTF affected soil in the staging area, and be analyzed for HTF using modified EPA Method 8015. Initially, samples would also be analyzed for ignitability and toxicity using the appropriate State and Federal methods to characterize the waste as hazardous or non-hazardous. Once a sufficient data set has been accumulated to allow characterization of the material as hazardous or non-hazardous based on HTF content and generator knowledge, the Department of Toxic Substance Control (DTSC) will be petitioned for a determination of waste classification for HTF-affected soils generated at the facility. Following this determination, subsequent samples would only be analyzed for HTF to make this determination.

At the Kramer Junction Solar Energy Generating Systems (SEGS) facility, DTSC issued a letter dated April 4, 1995 stating that soil contaminated with HTF “poses an insignificant hazard” and classifies the waste as non-hazardous for soils with a concentration of less than 10,000 mg/kg HTF pursuant to CCR Title 22, Section 66260.200(f). While this information from Kramer Junction alone may not be sufficient to characterize the waste material generated at the project site. Genesis Solar LLC anticipates that future waste characterization will yield a similar result and has designed the LTU accordingly.

All HTF-affected soil classified as a hazardous waste will be removed for the site for proper offsite disposal; therefore the material in the LTU will be managed as a non-hazardous “designated waste” as defined in CCR Title 23, Chapter 15, Section 2522. Appendix A includes the DTSC documentation from Kramer Junction and a Material Safety Data Sheets (MSDS) for HTF

Based on waste discharge requirements for similar sites, soil containing HTF in concentrations less than 100mg/kg will not be regulated as a waste when reused as fill at the Facility.

5.4 WASTE UNIT CLASSIFICATION [20210 & 20240]

In compliance with Table 2.1 in CCR Title 27, Chapter 3, Subchapter 2, Article 2 Section 20210, liquid designated wastes will be managed in full containment in a Class II surface impoundment with a double liner system and leak collection and recovery system (LCRS).

5.5 WASTE UNIT LOCATION [21750(A) & (B), 20240 & 20250]

5.5.1 TOPOGRAPHY

The land has less than a 1% fall from north east to south west, therefore it is suitable for location of a waste management unit.

5.5.2 GROUNDWATER

5.5.2.1 SEPARATION

As noted in Section 3.8, groundwater is between 70 and 90 feet bgs under the site. As the base of the waste management units will be between 2 and 10 feet below ground (refer **Section 6**), there will be a greater than 5 foot separation between the base of the unit and groundwater level.

5.5.2.2 COLORADO RIVER BASIN – WATER QUALITY CONTROL PLAN

Under the Porter-Cologne Water Quality Control Act, the Regional Boards are required to formulate and adopt water quality control plans for all areas within the region (RWQCB 2006). The CRBRWQCB published a Water Quality Control Plan to address the beneficial uses of state waters within the Colorado River Basin Region by preserving and protecting the quality of these waters (RWQCB 2006). The CRBRWQCB also enforces waste discharge requirements under the Porter-Cologne and Clean Water Acts (RWQCB 2006).

The Site is within the Hayfield Planning Area, which covers approximately 1,860 square miles of desert with barren mountains and valleys, with Chuckwalla Mountains on the south boundary and McCoy Mountains on the east boundary (RWQCB 2006). The Regional Board is currently reviewing the beneficial use designations so that they will correspond with individual groundwater aquifers within the hydrological unit (RWQCB 2006). Current designated beneficial uses include Municipal, Industrial and Agricultural; however, the existing high TDS concentrations in the shallow groundwater beneath the Site make the water unsuitable for domestic, municipal or agricultural water supply. A summary of the water quality objectives for CRBRWQCB is provided in **Table 8** and assessed against the Project.

A discharge impact area (DIA) analysis was performed to consider the chance of a single undetected hypothetical particle discharged directly into the regional aquifer. The analysis was performed using the following equation for horizontal linear velocity:

$$v = (K^*i)/n_e$$

Where K is the hydraulic conductivity in feet per day (ft/day), i is the hydraulic gradient expressed as a unitless fraction, and n_e is the effective porosity expressed as a percent. The effective porosity differs from the total porosity in that it only accounts for interconnected pores that contribute to groundwater flow. The following values were used in the DIA estimation:

- The horizontal hydraulic conductivity (K) is assumed to be 14 ft/day for the Bouse formation based on a study of the aquifer parameters conducted as part of Section 5.4 Water Resources the AFC
- The average hydraulic gradient (i) is considered to be 0.0009. This based on the regional flow gradient, which was determined from potentiometric contours near the site (Steinemann 1989). The hydraulic gradient is calculated by dividing the vertical distance between contours in the project area by the horizontal distance measured on the map. The horizontal distance coincides with the direction of groundwater flow at the project site. This hydraulic gradient does not take into account any cone of depression, which may occur as a result of groundwater pumping at the site. It also assumes immediate contact of evaporation pond discharge with the water table without vertical migration through the soils that underlie the site.
- The effective porosity (n_e) is estimated to be 10 percent. This value was based on sediment description in well logs on the site. The soil on the site varies from mostly fine sand with an effective porosity of 0.2 and clays with an effective porosity of 0.06 (Sara 2003). Typical porosity values for unconsolidated sand sediments range between 25 to 40 % (Knodel, Lange & Voigt, 2007). Effective porosity is the amount of pore space available for fluid flow and excludes the pores occupied by water absorbed onto particle surfaces. Effective porosity is therefore, less than porosity, and since this soil is dense and contains some clays and gravel, we have assumed 10% as a conservative estimate for effective porosity.

Inserting the parameter values into the above equation produces a horizontal flow velocity of 0.126 ft/day. Over a 30 year (10,950 day) period, this equates to a distance of 1,380 feet, or 0.26 miles. This distance represents the possible travel distance of a hypothetical particle injected directly into the aquifer at the evaporation pond after 30 years. The direction of the DIA is to the southeast, reflecting the regional groundwater flow direction, and is illustrated on **Figure 11**. However, due to the pond liner and leak detection system, it is highly unlikely that any discharge would enter the aquifer undetected.

5.5.3 FLOODPLAIN

There are no FEMA mapped floodplains on the Project site. As outlined in **Section 7.2**, stormwater will be managed on site to prevent inundation or washout due to floods with a 100 year return period.

5.5.4 GEOLOGY

The waste management units are located more than 200 feet from any know Holocene fault, in an area considered not be seismically active. The evaporation ponds will have a double liner system which may incorporate natural geological materials with a hydraulic conductivity of not more than 1×10^{-6} cm/sec, if available on site, or an approved engineered alternative (refer to **Section 6.1.5**).

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6. DESIGN AND CONSTRUCTION STANDARDS

6.1 GENERAL DESIGN DESCRIPTION OF EVAPORATION PONDS [21600(4)(A) & (B), 21760 (A), 20320, 20330, 20360]

6.1.1 OVERVIEW

The containment strategy for the evaporation ponds is summarized as follows:

- Size the ponds to achieve sufficient evaporative capacity under annual average and peak discharge conditions, allow for approximately 3 feet of evaporative residue accumulation, maintain a minimum of 2 feet freeboard at all times, and to allow one pond to be taken out of service for one year for maintenance without impacting the operation of the plant;
- Meet or exceed regulatory requirements for containment of liquid designated wastes;
- Select materials that are compatible with the physical, chemical and thermal characteristics of the wastewater and evaporation residue being contained;
- Protect against physical damage to the containment layers by including protective layers in the design of each containment facility;
- Allow for removal of evaporative residue without otherwise damaging the integrity of the containment systems; and
- Include the ability to monitor the integrity of the containment system, to collect and recover leakage through the primary liner, and to transfer fluids from one evaporation pond to another.

The proposed design for the evaporation ponds has been selected to optimize performance based on these operating criteria. The location of the evaporation ponds are shown in **Figure 8**. The proposed design for evaporation ponds are provided in the following figures:

- **Figure 12:** Evaporation Pond Section and Details
- **Figure 13A:** Evaporation Pond Cross Section for Unit 1
- **Figure 13B:** Evaporation Pond Cross Section for Unit 2

6.1.2 GENERAL DESCRIPTION

The 8 acre evaporation ponds have a proposed average design depth of 8 feet across each pond which incorporates:

- 3 feet of sludge buildup;
- 3 feet of operational depth; and
- 2 feet of freeboard.

The containment design for the evaporation ponds, from the surface of the evaporation ponds downwards, consists of the following:

- A hard surface / protective layer with granular fill/free draining sub-base over geotextile;
- A primary 60 mil high density polyethylene (HDPE) liner;
- An interstitial leak detection and removal system (LDRS) comprising a geomembrane geonet and collection piping;
- A secondary minimum 40 mil HDPE liner; and
- A base layer consisting of either a geosynthetic clay liner (GCL) or 2 foot of onsite material with a hydraulic conductivity of less than 1×10^{-6} cm/sec, of which 30% by weight, shall pass through a No. 200 Standard sieve.

6.1.3 HARD SURFACE / PROTECTIVE LAYER

The hard surface / protective layer provides protection against accidental damage to the HDPE liners which could be caused by burrowing animals, falling objects, varying climatic conditions and worker activities during maintenance. Secondly, the hard surface / protective layer will allow for removal of the precipitated solids within the evaporation ponds, if necessary. The proposed design consists of roller compacted concrete to serve as the hard surface protective layer for the ponds. Alternate hard surface media such as reinforced concrete, revetments, gunite, or combinations of these media may be submitted for approval as an alternate to the roller compacted concrete.

A granular fill/free draining native soil sub base is placed under the hard surface and is intended to serve two purposes:

- As the supporting base for the hard surfacing; and
- As a drainage layer between the hard surfacing and underlying primary liner.

6.1.4 LINER SYSTEM

HDPE was selected as the preferred material for the primary and secondary liners for the following reasons:

- It is chemically resistant to potentially high concentrations of dissolved salts;
- It is very durable during installation;
- It is strong and possesses desirable stress-strain characteristics; and
- It is the most common synthetic liner material and as such there is a broad base of practical experience associated with the installation of HDPE amongst construction contractors.

A 60 mil upper liner was selected to provide appropriate balance between strength and ductility characteristics, which is very important during liner installation. A non-woven geotextile will be

installed on top of the 60 mil liner to act primarily as a protective layer between the granular fill/free draining native soil and the upper liner.

A 40 mil lower liner was selected for the lower and secondary liner to provide slightly better ductility and handling characteristics during installation, as strength is of lesser importance for the secondary liner.

Both liners will be textured on both sides for safety purposes plus the texture provides a better interface against the surrounding materials.

HDPE possesses large thermal expansion and contraction characteristics, and exhibits stress when liner temperature exceeds 50°C. The temperature of the blowdown water is not expected to exceed 50°C.

6.1.5 BASE LAYER

A base layer is required to protect the underlying groundwater in the unlikely event that both synthetic liner materials are punctured during construction or operation of the evaporation ponds. This base layer also serves to provide a smooth, competent surface to support the overlying synthetic liners and leak detection system layers

The preferred design for the base layer is 2 feet of onsite material with a hydraulic conductivity of less than 1×10^{-6} cm/s, of which at least 30% by weight shall pass through a No. 200 U.S. Standard sieve. If this material is unavailable on site, then a GCL or approved equivalent is the alternative design for the base layer. For the project, GCL is proposed as an engineered alternative. GCL's are relatively simple to install and there are a number of manufacturers that provide a GCL product adequate to meet the project requirements (for example Bentomat by CETCO).

Title 27 of the CCR, Section 20330 outlines the requirements for clay liners. GCL's are not referenced in this section, therefore explanation to this engineering alternative is provided in **Section 6.2.**

6.1.6 LEAK DETECTION, COLLECTION AND REMOVAL SYSTEM

A HDPE geonet drainage layer, with an option for non-woven geotextile heat bonded to one or both sides, will be used in the leak detection and collection layer between the primary and secondary liners. HDPE geonet used in combination with geotextile materials has been selected because polyethylene is not reactive with the fluids and provides a highly conductive layer, it is readily available, and is easily installed with minimal potential for damage to the liner system during installation.

The base of the evaporation pond leak detection and collection layer will slope at a minimum inclination of 1% to a leak collection trench. The trench will contain screened coarse sand (with no fines) and a perforated pipe that will slope at a minimum inclination of $\frac{3}{4}\%$ towards a leak detection and collection sump, located at the lowest point in the pond. The water in the collection sump will drain by gravity to a monitoring well that is constructed for each evaporation pond (one well per pond). Automated pneumatic pumping systems in the monitoring wells will automatically

return water collected in the sump to that evaporation pond, which in turn minimizes the hydraulic pressures across the secondary liners and therefore the risk of leakage through the secondary liner. Leakage rates will be measured using a flow totalizer.

The collection sump, pipe, and monitoring well, will include prefabricated and field-fabricated HDPE components with water tight, extrusion welded and wedge welded seams and penetrations. The liner system will be installed in accordance with current practices. Destructive and non-destructive testing procedures will be used to verify sump and penetration tightness and continuity.

This design is consistent with CCR, Title 27, Section 20340, which requires a LDRS between the liners for surface impoundments.

6.1.7 BERMS AND SIDESLOPES

The side slopes around the evaporation ponds will contain the same liner system as the base of the ponds, except that leak collection pipes will not be located on the pond side slopes.

The berms shall be covered with a minimum 6-inch thickness of road base or approved equivalent. The top of the berms will be a minimum of 2 feet above the surrounding grade to prevent potential inflow of storm water.

6.1.8 MATERIAL COMPATABILITY [20320]

The wastewater will come into contact with the hard/protective layer. As outlined in **Section 6.1.3**, the media for this layer will either be roller compacted concrete or an approved equivalent alternate. All final media selection will be compatible with the wastewater by using quality concrete with maximum chemical resistance (specifications will be provided to the concrete manufacturer to ensure proper mix selection).

If there is leakage in the evaporation pond, the wastewater will come into contact with the primary/secondary liner. HDPE is chemically resistant to saline solutions and long term contact between the wastewater in the evaporation ponds and the HDPE liner system will not compromise liner integrity. Further explanation for HPDE selection is provided in **Section 6.1.4**.

The hard protective layers, liner system and base layer will have the ability to withstand the dissolved solids content of the water without degradation. These systems will not fail due to pressure gradients from physical contact with the wastewater and residue or undergo chemical reactions or degradation.

6.2 ENGINEERED ALTERNATIVE

6.2.1 REGULATORY REQUIREMENT

The performance standard for the liner system is outlined in CCR, Title 27, Section 20330:

“Liners shall be designed and constructed to contain the fluid, including landfill gas, waste and leachate, as required by Article 3 of this subchapter (Section 20240 et seq., and section 20310”

Under Section 20240 et seq., the relevant section to liner design is Section 20250, ‘Class II: Waste Management Units for Designated Waste’ (emphasis added):

- (4) *Class II surface impoundments are not required to comply with the requirements of (b)(1), but shall have a **liner system designed in accordance with the applicable SWRCB-promulgated provisions of Article 4 of this subchapter (Section 20310 et seq.)**. The RWQCB can allow Class II surface impoundments which are designed and constructed with a double liner system in accordance with that article to use natural geologic materials which comply with (b)(1) for the outer liner.*

Under Article 4, Section 20320 (d) requires that soils used within containment structures must have the following characteristics:

- (1) *At least 30 percent of the material, by weight, shall pass a No. 200 U.S Standard Sieve*
- (2) *The materials shall be fine grained soils with a significant clay content without organic matter, and which is a clayey sand, clay, sandy or silty clay, or sandy clay under a soil classification system having industry-wide use.*

In addition, Table 4.1 in this section requires clay liners to have a hydraulic conductivity of not more than 1×10^{-6} cm/sec.

Section 20330 also outlines the requirements for liners:

- (b) *Clay Liners: Clay liners for a Class II Unit shall be a minimum of 2 feet thick and shall be installed at a relative compaction of at least 90 percent.*
- (d) *Lined Area - Liners shall be installed to cover all natural geologic materials (at the Unit) that are likely to be in contact with waste (including landfill gas or leachate).*

6.2.2 ALTERNATIVE DESIGN

As outlined in **Section 6.1.5**, the preferred design for the base layer is 2 feet of on-site material with a hydraulic conductivity of less than 1×10^{-6} cm/s, of which at least 30 percent by weight shall pass through a No. 200 U.S. standard sieve.

Tests have not been made on the hydraulic conductivity of the shallow soil on site. Without additional information, it is not known whether or not the material can be placed to achieve a hydraulic conductivity of less than 1×10^{-6} cm/s.

The observed characteristics and grain size distribution of the on-site near surface soil indicates that soil with the proper gradation (greater than 30 percent passing through the No. 200 standard sieve) may not be available in the near surface. It is not known at this time how much effort and expense will be required to generate enough material to meet the requirements (maximum

hydraulic conductivity and minimum quantity passing the No. 200 standard sieve). Trucking the material from an off-site source to meet the gradation and hydraulic conductivity would prove very costly. Therefore a GCL is proposed as an alternative design for the base layer. The GCL is not mentioned specifically in the regulations and therefore would be considered an alternative design.

GCL is an acceptable alternative for many reasons;

- GCL has been demonstrated as a suitable base under HDPE liner systems, and has been used as a primary containment layer in many applications. GCL has been used successfully as an alternate to soil layers in many Class II impoundments in the State of California (Buena Vista Landfill in Watsonville and the Desert Valley Center Landfill to name several recent projects). Additionally, GCL was used in a similar application at the Carlota Heap Leach Containment in Arizona.
- Performance of GCL as a fluid barrier has been well documented. A report by the industry and academic professionals has been developed to support the design and use of GCL as a fluid barrier. The paper found at the following link discusses this subject: <http://www.rsgengineers.com/docs/2002-GCL%20design%20series%20part%201%20gcl%20performance%20as%20a%20fluid%20barrier.pdf>
- GCL is equivalent or superior to placement of a compacted low permeability base liner in several key respects:
 - GCL liners are constructed in a factory setting and subject to rigorous QA/QC protocols to assure uniform properties throughout the application. In situ construction of a compacted low permeability liner is also subject to rigorous field QA/QC, but is inherently more subject to variation than GCL as a result of the field construction process.
 - The permeability of GCL liners is designed to be equal to or less than a 2-foot layer of low permeability material with a hydraulic conductivity of 1×10^{-6} cm/s.
 - GCL liners will not contain coarse-grained particles that could potentially puncture the secondary HDPE liner during installation. Even with rigorous QA/QC, the presence of such particles in low permeability native or imported materials cannot be ruled out.
 - If a hole forms in the secondary HDPE liner, the GCL will swell with contact of wastewater and fill in the hole in the HDPE liner, to help prevent wastewater from escaping in the containment system. Native or locally imported low permeability materials may have less swell and hole plugging capability than the materials used for in GCLs.

As this system has been previously demonstrated at many sites, no pilot studies are proposed for this location if GCL is used. Carrier pipes are located below the base liner which shall be scanned with neutron probes semi-annually to detect moisture (refer to **Section 10.5** for further monitoring information). Leak detection monitoring reports that present the results from the neutron probe moisture detection system will be submitted to the CRBRWQCB.

6.3 CONSTRUCTION METHODS AND SEQUENCE FOR EVAPORATION PONDS [21600(4)(C) & 20310]

6.3.1 OVERVIEW

The containment construction process will follow these general steps:

- a) Stripping, grubbing and clearing of organic materials and topsoil from the construction area;
- b) Excavation and rough grading of the pond area, construction of berms, stockpiling of excess soil for later reuse;
- c) Installation of carrier pipe for the moisture detection (neutron probe) system beneath the base of the ponds;
- d) Construction of finish grading to sub grade, as needed, and excavation of the leak collection trench and detection/collection sumps;
- e) Scarification, moisture conditioning, compaction, proof rolling and testing of sub grade materials;
- f) Supplemental moisture conditioning of subgrade and placement of the GCL or equivalent layer material;
- g) Installation of secondary HDPE liner;
- h) Installation of leak detection layer, sump, and leak detection monitoring wells/extraction risers;
- i) Installation of primary HDPE liner;
- j) Installation of the non-woven geomembrane liner;
- k) Installation of granular fill/subbase; and
- l) Installation of hard surface.

6.3.2 MOISTURE DETECTION SYSTEM

The moisture detection system below the liner system consists of continuous carrier pipes installed at the sides and low point of each pond (one carrier pipe per pond) at a depth of approximately 5 feet below the secondary liner. The carrier pipes will be terminated at the surface on each side of the pond and will be equipped with a pull cable system for conveyance of a neutron probe for moisture detection.

6.3.3 SITE PREPARATION, EXCAVATION AND COMPACTION

The excavation and berm construction will use standard cut and fill techniques. Loose or compressible soils observed during excavation, if any, will be over excavated and replaced as compacted fill. The subgrade is to be scarified and moisture conditioned to 2 percent above the optimum moisture content, compacted to at least 90 percent relative compaction as determined

by American Society for Testing and Materials (ASTM) D1557, and proof-rolled using a smooth drum roller prior to placement of the GCL or the 2 feet of low permeable onsite material.

6.3.4 LINER SYSTEM INSTALLATION

6.3.4.1 SUBGRADE

The sub grade under the liner system will be scarified, moisture conditioned, compacted, and proof-rolled with a smooth drum roller to form a competent working surface. The subgrade beneath the GCL needs to have an adequate moisture content to ensure effectiveness of the GCL layer. Therefore, additional moisture conditioning will be specified immediately prior to installation of the GCL layer. The purpose of this is to add additional moisture beneath the GCL to provide moisture for hydration of the GCL material.

6.3.4.2 GCL / ONSITE MATERIAL

The GCL liner or onsite material base will be installed in accordance with current practices and will employ the use of proper installation requirements, following manufacturer requirements for the GCL and proper QA/QC during installation to ensure proper continuity of the base layer.

6.3.4.3 SECONDARY LINER

The secondary liner or lower liner will consist of a 40 mil thick HDPE geomembrane liner. This liner will be installed in accordance with current practices and will employ the use of wedge welding and extrusion welding procedures. In addition destructive and non-destructive testing procedures will be used to ensure liner quality and continuity.

6.3.4.4 LEAK DETECTION SYSTEMS

The leak detection system between the upper and lower liners consists of a geonet drainage media and a trench containing piping and sand bedding. The sand bedding in the trench, including the perforated piping system will have to be carefully placed on top of the underlying 40 mil HDPE liner. The geonet shall be placed across the top of the trench to avoid strain on the material. The construction sequence will have to be developed with the emphasis of material placement, spreading, and consolidation techniques that will ensure that damage to the liner does not occur.

6.3.3.5 PRIMARY LINER

The upper or primary liner will consist of a 60 mil thick HDPE geomembrane liner. Consistent with installation of the secondary 40 mil HDPE liner, current installation, quality control monitoring, testing, and quality assurance measures and techniques will be employed to ensure liner quality and continuity. The primary liner will be protected by a non-woven geotextile that will be installed directly on top of the liner.

6.3.5 HARD SURFACE / PROTECTIVE LAYER

A hard surface / protective layer will be constructed on the non-woven geotextile that covers the primary liner. The hard surface will allow for vehicular traffic during unscheduled or emergency

maintenance or cleanout. Hard surface types to be considered and assessed include roller compacted concrete, or an approved equivalent (formed concrete, gunite, or other alternates, all of which must be submitted for approval).

Prior to the placement of the hard surfacing, a 1 foot thick sub-base layer consisting of granular fill with a maximum particle size of ½" shall be placed and spread over the non-woven geotextile. The sub-based layer will be spread carefully and sequentially to avoid damage to the underlying liner system. After placement, the granular layer will be proof rolled using light compaction equipment.

Roller compacted concrete (RCC) can be transported in dump trucks and can be spread with a dozer or motor grader and compacted with a vibratory roller. Additionally, the RCC can be placed without joints, forms, reinforcing steel, and is not required to be finished. This will make the application of the hard surface/protective layer relatively economical.

An aggregate road base material will be placed along the top of each berm to provide an all weather access location for maintenance vehicles. The material will conform to the Department of Transportation Specifications for Class II Aggregate Base. This will be installed to a minimum thickness of 6 inches and will be placed and compacted in accordance with the Department of Transportation requirements.

6.4 GENERAL DESIGN DESCRIPTION OF LAND TREATMENT UNITS [20377]

6.4.1 OVERVIEW

The proposed design for the LTU has been selected to optimize performance based on the operating requirements specified in **Section 5.2**. The location of the LTU is shown in **Figure 8**. The proposed design for LTU is provided in **Figure 14**.

The LTU will not incorporate a liner containment system or LDRS, but will be constructed with a prepared base consisting of 2 feet of compacted, low permeability, lime-treated material. This base will serve as a competent platform for land farming activities, and will serve to slow the rate of surface water infiltration in the treatment area. The compacted and native soil beneath the LTU is designated as a "treatment zone" to a depth of 5 feet. Although the LTU will be taking vehicle traffic, no hard surface will be required, as there is no liner system to protect. A staging area is allocated in the LTU for storage of HTF-impacted soils while they are being characterized. Soil characterized as hazardous will be removed from the site; therefore, no additional liner system is required in the LTU to cater for the hazardous waste.

The LTU will be surrounded on all sides by a 2-foot high compacted earthen berm with side slopes of approximately 3:1 (horizontal: vertical). These berms will control and prevent potential inflow (run-on) of surface storm water into the LTU or runoff of stormwater from the LTU (refer to **Section 7.2.3** for further stormwater information).

6.4.2 HEAT TRANSFER FLUID TREATMENT PROCESS

Treatment of HTF-impacted soil in the LTU will involve moisture conditioning and addition of nitrogen and phosphorous nutrients (i.e., fertilizers) as needed to stimulate consumption of HTF by the indigenous bacteria. The HTF-impacted soil will be moisture conditioned and turned periodically as needed to enhance aeration, promote breakdown of HTF by the indigenous bacteria and/or to control dust emissions. Permanent or portable irrigation sprinklers will supply water to the area for dust control and to assist in treatment.

Treatment piles may be covered by plastic sheeting as needed to enhance temperature and moisture retention characteristics, and as needed to control storm water contact, odors and dust emissions.

Representative soil samples will be collected for every batch of HTF contaminated soil undergoing treatment in the LTU and composited according to methods specified in EPA SW-846. It is expected that treatment times will vary between one to four months, depending on initial concentrations, and the ambient air and soil temperature.

6.5 CONSTRUCTION METHODS AND SEQUENCE FOR LAND TREATMENT UNITS [21600(4)(C) & 20310]

6.5.1 OVERVIEW

The base layer construction process will follow these general steps:

- a) Prior to construction, the LTU area will be stripped, grubbed and cleared of topsoil;
- b) General excavation and grading to subgrade, as needed;
- c) Scarification and moisture conditioning of subgrade materials; and
- d) Placement, moisture conditioning, lime treatment, and compaction of native clayey silt material to form the base and perimeter berms, proof rolling after finish grading.

6.5.2 SITE PREPARATION, EXCAVATION AND GRADING

The LTU pad and berm construction will use standard cut and fill techniques. Native clayey silt material will be used to construct the pad and berms. The clayey silt material will be moisture conditioned and treated with at least 2 percent quicklime to achieve an R-Value of at least 40 to 50. Treatment and compaction of the material will be conducted using standard commercial lime treatment methods and equipment and compacted in lifts using a sheepsfoot roller. The lime treated layer will be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Field testing of the density of the soil will be performed at regular intervals. Compaction results will be recorded. After finish grading, the surface of the land treatment unit pad and berms will be proof rolled.

6.6 CONSTRUCTION QUALITY ASSURANCE [20323 & 20324]

6.6.1 INTRODUCTION

The quality assurance program is based on the State Water Resources Control Board-Construction Quality Assurance (CQA) Requirements under CCR, Title 27. The requirements themselves will be highlighted and an explanation of how the requirements will be met will follow immediately afterwards.

The evaporation ponds and LTU will be constructed as per the construction specifications that will be developed in accordance with the CQA plan provided herein. The CQA program will be implemented to ensure that construction is completed in accordance with design specifications.

For the evaporation ponds, CQA testing will be performed on the sub-grade, GCL, HDPE liners, granular/free draining native soil, and hard surface materials.

For the LTU, CQA testing will be performed on the sub-grade and compacted lime treated base and berm fill.

Construction inspection requirements will include approving of each layer to ensure that there are no deficiencies in that layer prior to placement of the next material based on observation and field tests. This will also include review of other CQA results to ensure that they are within the project's specifications.

Change authorization will flow through the on-site construction manager and will ensure that the Engineer of Record, as well as other required personnel have input in the decision of any change. Daily reports will be kept to ensure that activities are documented and personnel involved in the project are updated daily.

6.6.2 PERFORMANCE STANDARD

Quoting from the State Water Resources Control Board CQA requirements section (a):

The construction quality assurance (CQA) program, including all relevant aspects of construction quality control (CQC), shall provide evidence that materials and procedures utilized in the placement of the any containment feature at a waste management unit (Unit) will be tested and monitored to assure the structure is constructed in accordance with the design specifications approved by the RWQCB.

Genesis Solar LLC will implement quality control procedures that incorporate inspection and test procedures to make sure that the containment facilities are constructed properly and that they are monitored appropriately throughout the life of the project. These tests and procedures will be documented in detail throughout the project.

6.6.3 PROFESSIONAL QUALIFICATIONS

Quoting from the State Water Resources Control Board CQA requirements section (b):

(1) The design professional who prepares the CQA plan shall be a registered civil engineer or certified engineering geologist; and

(2) The construction quality assurance program shall be supervised by a registered civil engineer or certified engineering geologist who shall be designated the CQA officer.

Genesis Solar LLC will ensure that a design professional will prepare the CQA plan and will provide a design professional that will act as a CQA officer whose responsibility is to supervise the CQA program.

Construction activities and operations will be directed and supervised by qualified individuals and the design will be conceived and presented in accordance with recognized civil, mechanical and electrical engineering procedures and practices.

6.6.4 REPORTS

Quoting from the State Water Resources Control Board CQA requirements section (c):

(1) The project's CQA report shall address the construction requirements, including any vegetation procedures, set forth in the design plan for the containment system. For each specified phase of construction, this report shall include, but not be limited to:

(A) a delineation of the CQA management organization, including the chain of command of the CQA inspectors and contractors;

(B) a detailed description of the level of experience and training for the contractor, the work crew, and CQA inspectors for every major phase of construction in order to ensure that the installation methods and procedures required in the containment system design will be properly implemented;

(C) a description of the CQA testing protocols for preconstruction, construction, and postconstruction which shall include at

- 1. the frequency of inspections by the operator;*
- 2. the sampling and field testing procedures and equipment to be utilized, and the calibration of field testing equipment;*
- 3. the frequency of performance audits determined by the design professional and examined by the CQA officer;*
- 4. the size, method, location and frequency of sampling, sampling procedures for laboratory testing, the soils or geotechnical laboratory to be used, the laboratory procedures to be utilized, the calibration of laboratory equipment and quality assurance and quality control of laboratory procedures;*
- 5. the pass/fail criteria for sampling and testing methods used to achieve containment system design; and*
- 6. a description of the corrective procedures in the event of test failure.*

Genesis Solar LLC will provide the following:

- An outline of the chain of command of the CQA inspectors and contractors in the CQA management organization.

- A description of the CQA testing procedures for the preconstruction, construction, and post construction phases of the project.
- A CQA report that includes construction quality control requirements included in the design plan for each specified phase of construction.

6.6.5 DOCUMENTATION

Quoting from the State Water Resources Control Board CQA requirements section (d):

Construction quality assurance documentation requirements shall include, at the minimum: reports bearing unique identifying sheet numbers for cross referencing and document control, the date, project name, location, descriptive remarks, the data sheets, inspection activities, and signature of the designated authorities with concurrence of the CQA officer.

(1) *The documentation shall include:*

(A) **Daily Summary Reports** — *daily record keeping, which shall include preparation of a summary report with supporting inspection data sheets, problem identification and corrective measures reports. Daily summary reports shall provide a chronological framework for identifying and recording all other reports. Inspection data sheets shall contain all observations (i.e., notes, charts, sketches, or photographs), and a record of field and/or laboratory tests. Problem identification and corrective measures reports shall include detailed descriptions of materials and/or workmanship that do not meet a specified design and shall be crossreferenced to specific inspection data sheets where the problem was identified and corrected;*

(B) **Acceptance Reports** — *all reports shall be assembled and summarized into Acceptance Reports in order to verify that the materials and construction processes comply with the specified design. This report shall include, at a minimum, inspection summary reports, inspection data sheets, problem identification and corrective measures reports;*

(C) **Final Documentation** — *at the completion of the project, the operator shall prepare a Final Documentation which contains all reports submitted concerning the placement of the containment system. This document shall provide evidence that the CQA plan was implemented as proposed and that the construction proceeded in accordance with design criteria, plans, and specifications. The discharger shall submit copies of the Final Documentation report to the RWQCB as prepared by the CQA officer.*

(2) *Once construction is complete, the document originals shall be stored by the discharger in a manner that will allow for easy access while still protecting them from any damage. All documentation shall be maintained throughout the post closure maintenance period.*

These documents will include daily summary reports with supporting inspection data sheets that contain all observations. A record of field and laboratory tests will also be kept. Acceptance reports will be documents to ensure construction and materials comply with the original design and specifications. At the completion of the project, project closure documentation will be submitted to provide evidence that the CQA plan was implemented as proposed and that construction met design criteria, plans and specifications. The waste management units will undergo clean-closure therefore the post-closure maintenance period will not be applicable to the Project.

6.6.6 LABORATORY TESTING REQUIREMENTS

Quoting from the State Water Resources Control Board CQA requirements section (e):

(1) Analysis of earthen materials shall be performed prior to their incorporation into any containment system component. Representative samples for each layer within the containment system shall be evaluated. The following minimum laboratory testing procedures shall be performed:

(A) ASTM Designation: D 1557 91 [1/91], "Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m³)" which is incorporated by reference;

(B) ASTM Designation: D 422 63 (Reapproved) [9/90], "Standard Method for Particle Size Analysis of Soils," which is incorporated by reference; and

(C) ASTM Designation: D 2487 93 [11/93], "Standard Classification of Soils for Engineering Purposes," which is incorporated by reference.

(2) In addition to the tests listed in (e and f), the following minimum laboratory tests shall be performed on low-hydraulic-conductivity layer components constructed from soil:

(A) ASTM Designation: D 4318 93 [11/93], "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils," which is incorporated by reference; and

(B) United States Environmental Protection Agency (USEPA) Test Method 9100 [Approved 9-86], "Triaxial-Cell Method with Back Pressure," which is incorporated by reference.

Genesis Solar LLC will send materials proposed for construction to the lab to an accredited laboratory so that the quality and characteristics can be confirmed and compared to project specifications.

The tests will include the following as per section (e) of the State Water Resources Control Board CQA requirements above:

- ASTM Designation: D 1557 91 [1/91], "Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m³)"
- ASTM Designation: D 422 63 (Reapproved) [9/90], "Standard Method for Particle Size Analysis of Soils,"

- ASTM Designation: D 2487 93 [11/93], "Standard Classification of Soils for Engineering Purposes,"

For permeability (hydraulic conductivity) layers the following tests will be taken at a minimum:

- ASTM Designation: D 4318 93 [11/93], "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils,"
- United States Environmental Protection Agency (USEPA) Test Method 9100 [Approved 9-86], "Triaxial-Cell Method with Back Pressure,"

Periodic laboratory and In-situ analysis may be completed to supplement the CQA.

6.6.7 FIELD TESTING REQUIREMENTS

Quoting from the State Water Resources Control Board CQA requirements section (f):

The following minimum field test procedure shall be performed for each layer in the containment system: ASTM Designation: D 2488 93 [9/93], Standard Practice for Description and Identification of Soils (Visual Manual Procedure), which is incorporated by reference.

Genesis Solar LLC will use the following test on each layer in the containment systems associated with the evaporation ponds and LTU pad:

- ASTM Designation: D 2488 93 [9/93], Standard Practice for Description and Identification of Soils (Visual Manual Procedure)

In addition, in place nuclear densiometer testing ASTM D2922 will be performed paired with maximum density and optimum moisture content test, ASTM D 698.

6.6.8 TEST FILL PAD REQUIREMENTS

Quoting from the State Water Resources Control Board CQA requirements section (g):

Before installing the compacted soil barrier layer component of a final cover system, or the compacted soil component of a liner system, the operator shall accurately establish the correlation between the design hydraulic conductivity and the density at which that conductivity is achieved.

To accomplish this the operator shall:

(1) Provide a representative area for a test on any compacted foundation and low-hydraulic conductivity layers. The following minimum testing procedures shall be performed:

(A) the test pad foundation and, for final covers, the barrier layers shall be compacted with the designated equipment to determine if the specified density/moisture-content/ hydraulic conductivity relationships determined in the laboratory can be achieved in the field with the compaction equipment to be used and at the specified lift thickness;

(2) perform laboratory tests as specified in State Water Resources Control Board CQA requirements subsection (e); and

(3) perform field tests as specified in State Water Resources Control Board CQA requirements subsection (f). The discharger shall perform hydraulic conductivity tests in the test area under saturated conditions by using the standard test method ASTM Designation: D 3385 94 [9/94], "Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer," which is incorporated by reference, for vertical hydraulic conductivity measurements. A sufficient number of tests shall be run to verify the results. Other methods that provide an accurate and precise method of measuring field hydraulic conductivity may be utilized as approved by the RWQCB.

(4) Correlations between laboratory tests and test pad results shall be established for each of the various types of fill materials and blends to be used in construction of the actual cover.

When constructing compacted soil barrier layers, or a compacted soil component of a liner system, Genesis Solar LLC will provide a representative area for a test. The soil layers will be compacted with equipment that can achieve density, moisture content, and hydraulic-conductivities, where applicable at specified lift thicknesses. The laboratory tests mentioned in State Water Resources Control Board CQA requirements section (e) will all be performed.

Results from lab tests and field tests will be compared to ensure that the specified requirements can be met and that the methods and procedures selected and used achieve the required construction quality standard.

6.6.9 EARTHEN MATERIAL REQUIREMENTS

Quoting from the State Water Resources Control Board CQA requirements section (h):

(1) The following minimum tests shall include, but not be limited to:

(A) Laboratory tests as specified in State Water Resources Control Board CQA requirements subsection (e); and

(B) Field tests as specified in State Water Resources Control Board CQA requirements subsections (f and g).

(2) The following minimum testing frequencies shall be performed:

(A) Four (4) field density tests shall be performed for each 1,000 cubic yards of material placed, or at a minimum of four (4) tests per day;

(B) Compaction curve data (ASTM Designation: D 1557 91) graphically represented, and Atterberg limits (ASTM Designation: D 4318 93) shall be performed on the barrier layer material once a week and/or every 5,000 cubic yards of material placed;

(C) For field hydraulic conductivity tests, representative samples shall be performed on barrier layer material;

1. The frequency of testing may be increased or decreased, based on the pass/failure status of previous tests, as approved by the RWQCB.
2. Field infiltration tests shall be performed for the duration necessary to achieve steady conditions for the design hydraulic conductivity.
3. The following interpretive equation shall be used to determine the design hydraulic conductivity:

The infiltration rate (*I*) is defined as:

$$I = Q/(tA)$$

where:

Q = volume of flow;

t = interval of time corresponding to flow *Q*; and

A = area of the ring;

then the hydraulic conductivity (*k*) can be calculated from Darcy's law as follows:

$$k = I/i$$

where:

I = infiltration rate; and

i = hydraulic gradient.

When testing any soils used for construction, the tests mentioned in State Water Resources Control Board CQA requirements section e) above, will be performed as a minimum. There will be four field density tests performed per 1000 cubic yards of material placed or at least four tests per day. Compaction curve data including Atterberg Limits, will be performed at least once per week or every 5000 cubic yards of material placed. For field hydraulic conductivity tests (critical for the onsite material used in the base layer), the frequency of testing will be based on the pass/failure status of previous tests. They will be performed for the amount of time necessary to make sure steady conditions for the design hydraulic conductivity are met. The above equation $I = Q / (tA)$ will be used to determine design hydraulic conductivity.

During construction, all compacted soils and granular material will be tested using a nuclear density / moisture gauge (densiometer) (ASTM D2922 and D3017) to determine compaction percentage and moisture content. Nuclear densiometer testing will be performed to ensure compaction and moisture condition requirements as outlined in the project specifications are being achieved. Each material will be tested following compaction in multiple locations to ensure compliance to projects specifications prior to proceeding with placement of the next material.

6.6.10 GEOSYNTHETIC MEMBRANE REQUIREMENTS

Quoting from the State Water Resources Control Board CQA requirements section (i):

(1) *Performance requirements for the geosynthetic membrane include, but are not limited to, the following:*

- (A) *a need to limit infiltration of water, to the greatest extent possible;*
- (B) *a need to control landfill gas emissions;*
- (C) *for final covers, mechanical compatibility with stresses caused by equipment traffic, and the result of differential settlement of the waste over time; and*
- (D) *for final covers, durability throughout the post closure maintenance period.*

(2) **Minimum Criteria** — *The minimum construction quality assurance criteria to ensure that geosynthetic membranes will meet or exceed all design specifications shall include, but not be limited to:*

(A) *Preconstruction quality control program:*

- 1. *inspection of the raw materials (e.g., density, melt flow index, percent carbon Black);*
- 2. *manufacturing operations and finished product specifications (e.g., thickness, puncture resistance, multi axial stress/strain tests),*
- 3. *fabrication operations (e.g., factory seaming);*
- 4. *observations related to transportation, handling, and storage of the geosynthetic membrane; and*
- 5. *inspection of foundation preparation;*

(B) *Construction activities:*

- 1. *the geosynthetic membrane shall have thickness strength sufficient to withstand the stresses to which it shall be subjected, including shear forces, puncture from rocks or, for final covers, penetration from roots.*
- 2. *inspection of geosynthetic membrane placement (e.g., trench corners, monitoring systems).*
- 3. *seaming of the material; and*
- 4. *installation of anchors and seals;*

(C) **Post construction Activity** — *post construction activity includes checking for material and placement imperfections in the installed geosynthetic membrane. Imperfections that jeopardize the integrity of the membrane's function as an impermeable barrier (i.e., pin holes, rips, creases created during placement) shall be repaired to the original manufacturer's specifications and reinspected by the CQA officer; and*

(D) **Evaluation** — *evaluation of the personnel and equipment to be used to install and inspect the geosynthetic membrane, and pass/fail criteria and corrective procedures for material and installation procedures shall be specified as required in State Water Resources Control Board CQA requirements subsection (c).*

Genesis Solar LLC, will make sure that the geosynthetic membrane (geomembrane) used for containment will limit the infiltration of water to the greatest extent possible and be designed to maintain durability throughout the life of the project. Genesis Solar LLC, will ensure that a preconstruction quality control program is in place to ensure that manufactured geomembrane products conform to the project specifications.

Once construction activities begin, Genesis Solar LLC will make sure that the proper material is used and supervise and inspect the placement of the geomembrane and the seaming of the material in the evaporation ponds. After construction, Genesis Solar LLC will check for imperfections in the installed geomembrane and ensure that repairs are completed in accordance with project specifications. The HDPE liner will be manufactured and installed according to industry standards and test procedures and the installer's CQA methods and procedures. Typical quality assurance methodologies include the review and inspection of the following:

- Copy of the mill certificates;
- Coupons from every seam;
- Perform air pressure tests;
- Inspections to ensure the absence of tears, punctures, and blisters;
- Liner production tests, thickness, dimensions, visual inspection;
- Product testing, tensile properties, tear resistance, etc;
- Sub-grade preparation sign-off; and
- Wedge welding and extrusion welding seam logs and weld tests;

6.6.11 RELEVANT SPECIFICATIONS

The following specifications from the Construction Specification Institute will be developed, as a minimum:

- 31 14 13 Soil Stripping and Stockpiling
- 31 14 11 Earthwork and Related Work
- 31 23 10 Excavating, Trenching and Backfilling
- 32 11 23 Aggregate Base Courses
- 31 32 21 Geotextiles
- 31 32 22 Geomembranes
- 32 12 16 Asphalt Paving (If applicable)
- 32 13 23 Roller Compacted Concrete Paving (If applicable)
- 32 21 13 or 32 31 25 Fencing

7. GRADING AND DRAINAGE

7.1 GRADING PLANS [21600(4)(D)]

Earthwork will be required for the construction of the evaporation ponds and LTU. The following figures outline the existing contours and finished grades:

- **Figure 15:** Conceptual Site Drainage and Grading Plan
- **Figure 16:** Evaporation Pond and Land Treatment Unit Drainage and Grading Plan

The evaporation ponds are designed in tiers to minimize the earthwork requirements. The finished elevations of each pond, including the berm and top of the base is shown in **Figure 16** and a cross section profile provided in **Figure 13A** and **13B**. There will be additional grading required below the base to accommodate the subbase, liners and LDRS. The areas of pervious and impervious surfaces are shown on **Figure 17**.

7.2 STORMWATER MANAGEMENT [20365]

A revised conceptual drainage study for this project was undertaken by WorleyParsons in August 2009 and provided in the Drainage, Erosion and Sediment Control Plan (Appendix A of the AFC). The objective of the conceptual drainage study was to investigate the hydraulic and hydrologic conditions associated with the development of the Project site and provide mitigation requirements for the anticipated increase in stormwater run off due to development.

7.2.1 OFFSITE DRAINAGE

In desert washes, catchment boundaries are known to continually shift over time based on the ground conditions, intensity of the storm event, velocity of the flow and sediment transportation. The watershed boundary and sub-basin boundaries were selected for this project site based on existing information from available state watershed information, contour intervals, USGS quadrangle maps and available soils mapping information. The total watershed modeled encompasses 93,182 acres of which 91,696 acres are off-site. The off-site watershed was broken down into three sub-basins as required to determine the flow from the ephemeral washes as they approach the Project site. It is assumed that flows are unimpeded at all crossings structures that exist. This assumption is conservative because it does not take into account any storage or reduction in peak flows that may be associated with an undersized crossing structure.

Under post-developed conditions, it is proposed to divert the off-site watershed in three channels:

1. Runoff from sub-basin 1 (north-western) will be diverted through a channel on the west side of the west 125 MW unit (Unit 1);
- Runoff from sub-basin 2 (north) will be diverted through a channel between the two 125 MW units; and

- Runoff from sub-basin 3 (north-eastern) will be diverted through a channel along the east side of the east 125 MW unit (Unit 2).

All these three main channels will divert flows downstream of the Site following their existing drainage paths, causing no impact to the Site.

The main purposes of the diversion are to prevent interaction with off-site stormwater and onsite stormwater which will:

- Allow natural groundwater recharge of the off-site stormwater with no contact with the changed flow conditions of the on-site water;
- Protect the Site infrastructure from flash flood events, which have the potential to damage the solar parabolic troughs;
- Control treatment of the on-site flows from the solar collector array (location of heat transfer fluid within the solar parabolic troughs);
- Protect the Site from upstream sediment loading;
- Control on-site flows in detention basin to ensure there is no increase in post developed flow discharging from the site, minimizing the impact on downstream drainage features (lake playas etc), and
- Maximize the developable area within the solar field.

7.2.2 ONSITE DRAINAGE

On-site storm water management for the completed facility will be provided through the use of source control techniques, site design and treatment control.

The storm flows from the solar collector arrays will be treated through the use of swales, ditches and detention ponds. Minimum preliminary volumes required for the detention basins are 66 acre-feet for Unit 1, and 49 acre-feet for Unit 2. These volumes are based on the detention ponds receiving the 100 year, 24 hour event post-development runoff from the Project site, and then discharging the run-off at the pre-developed rate into the existing drainage system. The Riverside County Best Management Practice (BMP) Manual requires extended detention basins to release runoff over a 48 hour draw down period, and the outlet sized to retain the first half of the design volume for a minimum of 24 hours.

Locations within the power block for the potential of chemical or oil releases will be fully contained. Rainfall within the containment areas will be allowed to evaporate or will be drained through an oil water separator. Locations within the power block where "contact" storm water may occur will be contained within a system of curbs or trenches. Drains from these curbed areas or containment trenches will be directed to an oil water separator. The oil separated and captured within the oil water separator will be trucked off-site to a licensed disposal/recycling facility. Clean water discharged from the oil water separator will be used on Project site by discharging it to the cooling tower or to the raw water storage tank. The water discharge from the oil water separator will not be discharged to the storm water system.

7.2.3 STORMWATER DESIGN FOR EVAPORATION PONDS AND LAND TREATMENT UNIT

Both the evaporation ponds and LTU are surrounded by berms which will control and prevent potential inflow (run-on) of surface stormwater into the evaporation ponds and LTU or runoff of stormwater from the ponds and unit. The berms will protect stormwater entering the evaporation ponds and LTU in the 100 year, 24 hour storm event.

Precipitation that falls on the berms between the evaporation ponds will enter into the evaporation ponds. Due to the minimal run off expected from these small areas between the ponds, the drainage swales were not incorporated in the design.

As outlined in **Section 5.1.2.3**, precipitation that accumulates in the LTU will be pumped to the evaporation ponds only after visual observation to establish the water is free from HTF product, sheen or other evidence of contamination. If contamination is observed, the stormwater will be pumped into a holding tank prior to offsite disposal. Because significant precipitation events are relatively isolated, transfer of accumulated rainwater collected in the LTU is expected to be needed only every approximately three to five years.

A drainage channel is located on the southern boundary of the waste management unit area to direct all stormwater run off into the retention basin, rather than into the drainage channel east of the waste management unit area containing the off-site flow.

7.2.4 BEST MANAGEMENT PRACTICES

Stormwater BMPs will be provided on Site and are included in the Storm Water Pollution Prevention Plans (SWPPPs) in compliance with the NPDES General Permit for Storm Water Discharges Associated with Construction Activity and Operation of the Site. These are contained within the DESCP for the Project (Appendix A of the AFC). During construction, BMPs will include:

- Temporary Erosion Control Measures: construction of berms and ditches re-vegetation, slope stabilizers (interior slopes of the berms in the evaporation ponds are to be stabilized before the liner systems are placed), dust suppression and sediment barriers;
- Sediment Control: Silt fences, gravel bags, fiber rolls, check dams and street sweeping;
- Tracking Controls: Stabilize entrance and exit;
- Wind Erosion Controls: Applying potable groundwater to disturbed areas and covering exposed stockpiles;
- Non-Stormwater Control: Inspect vehicles for leaks and dispose of cement appropriately; and
- Waste Management and Materials Pollution Control: use watertight containers, prevent run off (with berm, trench etc), into the storage areas and clean up spills immediately after discovery.

Permanent BMPs shall also be provided to protect the evaporation ponds and LTU during operation of the Site. These BMPs will include the following erosion and sediment control measures:

- Berms around the evaporation ponds and LTU;
- Exterior slopes of the berms stabilized to prevent wind and water erosion after completion of the liner system placement; and
- Drainage channel north of the evaporation ponds and LTU to direct flow away from the pond and unit area.

8. OPERATING CRITERIA

8.1 SITE RECORDS [21600(B)(5)(A), 20375 & 21720]

In accordance with Title 27 CCR 20510, key site records will be kept in the office at the Genesis Solar LLC Facility. Records will be available for inspection by authorized representatives of the LEA (Local Environmental Agency) and CRBRWQCB during the facilities regular working hours. Alternatively, an inspection can be arranged by notifying the Facility manager. All required records will be properly completed, filed for retention and maintained throughout the operating life of the evaporation ponds and LTU.

8.1.1 OPERATING RECORD

The operating record maintained at the Genesis Solar LLC Facility will include the following information:

1) EVAPORATION PONDS ONLY:

- **Discharge Volumes** - Date and volume of discharges into each evaporation pond.
- **Monitoring Results** - Results of monitoring, analyses, and testing required by permit or regulatory requirement (including the daily water level measurements, a hydrometer for daily salinity measurements, and a direct reading thermometer with the temperature data recorded at least diurnally required for avian management).
- **Inspection Forms** - Inspection results that include a description of any required maintenance or remedial action and the date of implementation.

2) LAND TREATMENT UNIT ONLY:

- **HTF Spill Records** – These records shall include the time and location and estimated quantity of HTF leaked, and the estimated volume of soil affected.
- **Monitoring Results** – Results of monitoring, analyses, and testing of the soil at the LTU required by the WDRs or regulatory requirements.
- **Inspection Forms** – Inspection results including a description of required inspection, sampling, maintenance or remedial action at the LTU, and the date of implementation, including the dates of soil turnings. Special occurrences encountered during operation of each unit and methods used to resolve problems arising from these events, including details of incidents that required implementing emergency procedures, will be included in these forms.
- **Waste Transmittal Forms** – Identify date, source of waste, estimated volumes, operators, laboratory reports and location in the LTU into which the HTF-impacted soils, were placed.
- **Waste Manifests** – Completed non-hazardous or hazardous waste manifests for each shipment of HTF impacted soil waste removed from the Facility for off-site disposal.

3) BOTH EVAPORATION PONDS AND LAND TREATMENT UNIT:

- **Contingency Implementation** - Written reports prepared in response to any incident requiring implementation of the Contingency Plan.
- **Correspondence with Local Agencies** - Correspondence associated with emergency arrangements agreed to or refused by local authorities.
- **Employee Information Records** - Records documenting employee information such as job title for each position, job description, names of employees in each job, and introductory and continuing training received.
- **Notifications of Violations** - Notices of deficiency, abatement orders or any other notification of violation by any regulatory agency.
- **Complaints** – The Facility manager will record public complaints received regarding operation of the evaporation ponds and LTU, including:
 - the nature of the complaint;
 - the date the complaint was received;
 - if available, the name, address, and telephone number of the person or persons making the complaint; and
 - actions taken to respond to the complaint.

8.1.2 WASTEWATER DISCHARGE VOLUMES

In accordance with Title 27 CCR 21720(f), all discharges into the evaporation ponds will be recorded in the Operating Record. The following items will be recorded include:

- Volume in million gallons per day (mgd);
- Cumulative total of wastewater flow, in million gallons, per month; and
- The maximum daily flow rate, in mgd, each month.

8.1.3 WASTEWATER LEVELS

The water level in the pond will be dependant on the quantity of wastewater discharged in to the pond, evaporation rate and sludge accumulation. The evaporation ponds will outfitted with a level gauge for daily water level information. Discharge to the ponds will be managed as needed to discourage wading birds from using the ponds.

8.1.4 WASTE MANIFESTS

Upon delivering a load of hazardous or non-hazardous HTF-impacted soil from the Facility to a landfill, the accompanying waste manifest will be signed and dated by the truck-receiving operator to verify receipt, then the driver/hauler will be given a signed copy of the manifest. As necessary, a copy of the Waste Transmittal Form or equivalent will be attached to the manifest. Within 30 days of receipt of hazardous waste, a signed copy of the hazardous waste manifest will

be sent by the landfill to the generator and to the DTSC. This return manifest will be maintained by the Facility with the original manifest. If a return manifest is not received within 30 days, the Facility shall contact the landfill determine the reason why the return manifest has not been received. If a return manifest is not received within 15 days after the due date, a discrepancy report shall be filed with the DTSC Manifests, related documents, and corresponding daily delivery logs for wastes leaving the Facility will be collected and reviewed. Manifests will be compared to the daily logs to assure manifests are collected.

8.1.5 MONITORING RESULTS

Monitoring Plan results will be retained at the Facility as part of the Operating Record.

8.1.6 INSPECTION AND OPERATIONS RECORDS

Site personnel will complete the inspection logs and other required operation documentation and the facility management will review the applicable documents for completeness and accuracy. Completed inspection logs and notations of needed repairs will be maintained for a minimum of three years.

Further information regarding Inspection and Maintenance requirements are outlined in **Section 10**.

8.1.7 RECORD OF CONTINGENCY PLAN IMPLEMENTATION

Following any incident which requires implementation of the Facility's Contingency Plan, a report will be prepared containing the information described in Title 27 CCR Section 21760(b)(2). As a minimum, the report will be submitted to the LEA and the CRBRWQCB. In addition, a copy will be retained on file at the Facility as part of the Operating Record.

Further information regarding the Contingency Plan requirements is outlined in **Section 11**.

8.1.8 CORRESPONDENCE REGARDING ARRANGEMENTS WITH LOCAL AUTHORITIES

Copies of all correspondence with local authorities regarding emergency response arrangements and revisions of the Contingency Plan will be maintained at the Facility.

8.1.9 TRAINING RECORDS

In accordance with Title 27 CCR Section 20610, the following records will be retained for each position related to waste management as part of the Operating Record:

- A job title and written job description including assigned duties and required qualifications;
- Name of the employee filling each job;

- Description of initial and continuing training; and
- Documentation of initial and continuing training received.

Whenever a training course is conducted, the records for each employee who completed the course will be updated. When a new employee is hired, a training record file will be initiated for the new employee. Personnel training records on current employees are retained until final closure of the Facility. Records on former employees are retained for three years after the employees' leave date.

8.1.10 DESIGN DOCUMENTS

In accordance with the requirements of Title 27 CCR Section 21760, design, as-built, and operating documentation related to the evaporation ponds and LTU will be retained at the Facility as part of the Operating Records.

8.1.11 OTHER REQUIRED TECHNICAL DOCUMENTS

In accordance with Title 27 CCR Section 20510 and 20517, all other technical records associated with the evaporation ponds and LTU will be retained at the Facility as part of the Operating Record.

8.1.12 EXCAVATION RECORDS

Records of excavations which may affect the safe and proper operation of the LTU, or cause damage to adjoining properties, as required by 27 CCR, Section 20510(b) will be kept in the operating record.

8.1.13 OPERATOR / RESPONSIBLE PARTY RECORDS

Records of written notification to the LEA, local health agency, and fire authority of names, addresses and telephone number of the operator or responsible party of the site, as required by 27 CCR, Section 20510(e), will be kept in the operating record.

8.2 SECURITY [21600(B)(5)(B)]

In accordance with Title 27 CCR Section 21600(b)(5)(B) and 20530, security measures will be provided to ensure the safest environment for employee working at the Facility. Security measures include barriers and warning signs.

8.2.1 BARRIERS

The entire site will be fenced appropriately to restrict public access during construction and operations. Chain-link security fencing will be installed around the site perimeter, switchyard and other areas requiring controlled access. The security fence will be 8 feet tall, topped with 1 foot of barbed wire (three strands) mounted on 45-degree extension arms and posts set in concrete.

Controlled access gates will be located at the entrances to the facility. Site gates will be swing or rolling type access gates. Access through the main gate will require an electronic swipe card, preventing unaccompanied visitors from accessing the Facility. All Facility personnel, contractors and visitors will be logged in and out of the Facility at the main office during normal business hours. Visitors and non-Genesis Solar LLC employees will be allowed entry only with approval from a staff member at the Facility.

8.2.2 WARNING SIGNS

Each point of access from a public road shall be posted with an easily visible sign indicating the facility name, and other pertinent information as required by the WDR.

8.3 SANITARY FACILITIES [21600(B)(5)(C)]

In accordance with Title 27 CCR Section 21600(b)(5)(C), sanitary facilities will be provided at the site for facility employees in the office. The Facility will maintain all sanitary and hand-washing facilities which may be required, by applicable state or local requirements, in a reasonably clean and adequately supplied condition.

8.4 COMMUNICATION SYSTEMS [21600(B)(5)(D)]

Communication facilities will be provided at the site for facility employees that meet the requirements specified in the AFC and Title 27 CCR Section 21600(b)(5)(D).

8.4.1 INTERNAL COMMUNICATION

The internal communication system for the Facility will include the following devices:

- Alarm system;
- Two-way radios;
- Telephones; and
- Intercoms.

Each Facility building will also be equipped with telephones. Operations supervisors and other key personnel may carry hand-held two-way radios that can be used to contact the Facility office or other site personnel in an emergency. The selected frequency of the radios will be chosen as not to interfere with frequencies used by the nearby U.S. Air Force Base.

8.4.2 EXTERNAL COMMUNICATION

Twenty-four hour access to outside emergency services, including police and fire departments and emergency response teams, is available through the commercial telephone system at the Facility.

8.5 LIGHTING [21600(B)(5)(E)]

Lighting will be provided at the Facility to ensure safety of employees during night time activities, and will meet the requirements of Title 27 CCR Section 21600(b)(5)(E). The Facilities lighting system will provide operations and maintenance personnel with illumination in both normal and emergency conditions. The system will consist primarily of AC lighting, but will include DC lighting for activities or emergency egress required during an outage of the facilities' AC electrical system. The lighting system will also provide AC convenience outlets for portable lamps and tools. Permanent lighting will be provided primarily along the paved access road to the Facility and in the power block area. Lighting in the evaporation pond and LTU area will be provided when needed using portable light stands.

8.6 SAFETY EQUIPMENT [21600(B)(5)(F)]

In accordance with 27 CCR Section 21600(b)(5)(F), safety equipment will be provided for the health and safety of employees at the Facility. As specified in the AFC, a Personnel Protective Equipment (PPE) Program will be developed for the facility, which will apply to all contractor and subcontractor employees, as well as direct Genesis Solar LLC employees during operation.

Specific requirements of the PPE Program include:

- Determine and provide personal protective devices for specific jobs.
- Provide proper head protection requirements.
- Establish eye and face protection requirements.
- Identify body protection equipment requirements.
- Implement hand protection requirements.
- Define proper foot protection.
- Provide proper sanitation facilities.
- Determine safety belts and life lines job requirements.
- Establish procedures to prevent and protect personnel from electric shock.
- Identify onsite and offsite medical services and first aid requirements.
- Specify respiratory protection requirements for jobs.

Required PPE will be approved for use and distinctly marked to facilitate identification. The type of PPE required to operate, maintain and monitor the evaporation ponds and LTU will be described in the job safety analysis undertaken prior to the commencement of operations.

8.6.1 REQUIRED EQUIPMENT

The following equipment shall be available at the Facility to minimize hazards associated with Facility operations:

- Alarm systems and internal communications;
- Radio and telephone systems;
- Emergency equipment for fires and spills; and
- Water supplies for fire fighting.

8.6.2 EMERGENCY EQUIPMENT

In accordance with the Emergency Action Plan as specified in the AFC, the Facility will include obtaining emergency response equipment. This equipment will be strategically located throughout the facility in order to respond to emergencies in a timely fashion.

8.6.3 WATER SUPPLIES FOR FIRE EQUIPMENT

In accordance with the Fire Protection and Prevention Plan as specified in the AFC, the Facility will be equipped with water at adequate volume and pressure to supply water hose streams. The fire projection water system will be supplied from a dedicated 360,000-gallon portion of the raw water storage tank located on the plant site.

8.6.4 EQUIPMENT TESTING AND MAINTENANCE

In accordance with the Emergency Action Plan as specified in the AFC, all emergency equipment at the Facility, including communications and alarm systems and fire and spill prevention equipment, will be tested and maintained.

8.7 PERSONNEL REQUIREMENTS [21600(B)(5)(G)]

In accordance with Title 27 CCR Section 21600(b)(5)(G), written job descriptions will be maintained for each position at the facility related to management of waste in the permitted evaporation ponds and LTU at the Facility. These descriptions will be updated periodically by facility managers and supervisors to reflect the changing needs of the facility. Job descriptions will be kept on file at the facility and include the following information:

- Job title/position;
- Duties/responsibilities; and
- Job prerequisites and qualifications.

All Facility employees will receive training in general Facility procedures and operations and emergency response procedures. Personnel receive job-specific training during on-the-job training as required. This training ensures that personnel are sufficiently proficient in the particular skills required to perform their assigned duties and that they are aware of the inherent

hazards. The management, planning, and operations personnel will have varying backgrounds with respect to the management and operation of the evaporation ponds at the Facility. Technical staff will gain experience with these systems mainly through on-the-job training. A record of training and experience of each employee will be maintained at the Facility office..

8.8 PERSONNEL TRAINING [21600(B)(5)(H)]

An Operations Safety Training Program for employees and contractors will be developed for the Facility as specified in the AFC that will meet the requirements of Title 27 CCR Section 21600(b)(5)(H). The Operations Safety Training Program will be revised as required to include any additional training necessary as Facility equipment or operations change. Additional job-specific training may be completed by Facility personnel as needed.

The staff person overseeing the portion of the training program pertinent to the LTUs and evaporation ponds will be experienced in the operation of such units, waste management procedures and applicable regulations, emergency response and contingency plan implementation.

All Facility employees will be required to receive training in the following areas:

- Injury and Illness Prevention;
- Emergency Action Plan;
- Personal Protective Equipment;
- Fall Protection;
- Fire Protection and Prevention;
- Confined Space Entry Program;
- Hazard Communication;
- Hand and portable power tool safety;
- Heat Stress and Cold Stress Safety;
- Hearing Conservation; and
- Back Injury Prevention.

Additional training will be required for specific tasks. The topics applicable to operation of the evaporation ponds may include:

- Evaporation Pond Operation;
- Forklift Operation;
- Front-End Loader Operation;
- Mobile Equipment Safety;
- Inspection and Monitoring Program;
- Sludge and Water Sampling;
- Equipment Inspections;

- Employee Exposure Monitoring Program; and
- Housekeeping and Material Handling.

The topics applicable to operation of the LTU may include:

- Land farm Operation;
- Forklift Operation;
- Front-End Loader Operation;
- Mobile Equipment Safety;
- Inspection and Monitoring Program;
- HTF Material Safety Data Sheet Training;
- Soil Sampling;
- Equipment Inspections;
- Employee Exposure Monitoring Program; and
- Housekeeping and Material Handling.

8.9 SUPERVISORY STRUCTURE [21600(B)(5)(I)]

In accordance with 27 CCR Section 21600(b)(5)(I), the Facility Supervisor will be experienced in solar facilities operations and maintenance to ensure that the facility is properly operated in accordance with all applicable laws, regulations, permit conditions and other requirements. All shift managers and equipment operators will report to the Facility Supervisor.

9. ENVIRONMENTAL CONTROLS

9.1 NUISANCE CONTROL [21600(B)(8)(A)]

In accordance with Title 27 CCR Section 21600(b)(8)(A), the evaporation ponds and LTU will be operated in compliance with all applicable permits and regulatory conditions to prevent creating environmental hazards and public nuisance. Given compliance with permits and conditions and the nature of the evaporation ponds, nuisance conditions are unlikely to arise. In addition, the land treatment units are located in a relatively isolated area away from potential receptors, so the public is unlikely to be impacted by these operations. If complaints are generated, they will be reported to the LEA within 24 hours.

9.2 FIRE CONTROL [21600(B)(8)(B)]

A Fire Protection and Prevention Program will be prepared for the Facility as specified in the AFC and will meet the requirements of Title 27 CCR Section 21600(b)(8)(B). The plan will include measures relating to safeguarding human life, preventing personnel injury, preservation of property and minimizing downtime due to fire or explosion. Fire protection measures will include fire prevention methods to prevent the inception of fires. Of concern are adequate exits, fire-safe construction, reduction of ignition sources, control of fuel sources, and proper maintenance of fire water supply and sprinkler systems.

The Fire Protection and Prevention Plan for the Facility will include the following sections:

- Scope, purpose, and applicability;
- Potential fire hazards;
- Proper handling and storage of potential fire hazards;
- Potential ignition sources;
- Control of potential ignition sources;
- Persons responsible for equipment and systems maintenance;
- Portable fire extinguishers;
- Automatic sprinkler fire suppression system;
- Water-spray fire system;
- Local fire department;
- Training;
- Housekeeping procedures; and
- Record keeping requirements.

The Facilities fire protection water system will be supplied from a dedicated 360,000-gallon portion of the raw water storage tank located on the plant site. One electric and one diesel fueled backup firewater pump, each with a capacity of 3,000 gallons per minute, will deliver water to the fire protection water-piping network. A smaller electric motor-driven pump jockey pump will

maintain pressure in the piping network. If the jockey pump is unable to maintain a set operating pressure in the piping network, the diesel fire pump starts automatically.

A piping network will be configured in a loop so that a piping failure can be isolated with shutoff valves without interrupting the supply of water to a majority of the loop. The piping network will supply fire hydrants located at intervals throughout the power plant site, a sprinkler deluge system at each unit transformer, HTF expansion tank and circulating pump area and sprinkler systems at the STG and in the operations and administration buildings. Portable fire extinguishers of appropriate sizes and types will be located throughout the plant site. Fire protection for the solar field will be provided by zoned isolation of the HTF lines in the event of a rupture that results in fire. As vegetation or other combustible materials will not be allowed in the solar field, the HTF will be allowed to extinguish itself naturally, since the remainder of the field is of nonflammable material (aluminum, steel, and glass).

The facility will form an industrial fire brigade of specially trained employees. At least one member of the brigade will be on site 24 hours a day. Each sprinkler system will be inspected on a weekly, monthly, and quarterly basis by the fire brigade; and annually by state-licensed fire protection specialists.

Fire support services to the site will be under the jurisdiction of the Riverside County Fire Department. Fire Station No. 43 in Blythe, equipped with a medic engine, a squad, a county engine, and a water tender, and Fire Station No. 45 located at the Blythe airbase, equipped with a medic engine, are the closest stations to the project area.

The closest fire suppression team to the Project site is located at the Chuckwalla Valley State Prison. The Chuckwalla fire team responds to fires located within the two prison complexes (Chuckwalla Valley and Ironwood) and within a 20-mile radius. The Chuckwalla fire team has two type one engines. One engine is used only to deal with fires located at the prisons; the other can be used to fight fires in the surrounding area (within 20 miles). The fire team is staffed by inmates, as well as one captain employed by the California Department of Corrections, and works in conjunction with the Riverside County Fire Department (Dobrinin, 2009).

The Riverside County Fire Department has two hazardous materials (hazmat) teams, each consisting of approximately 10 to 20 trained hazmat personnel. Both teams are Level A response teams capable of handling all types of chemical, biological, radiological, and nuclear responses. Fire Station 81, located in Palm Desert, approximately 100 miles west of the Project site, is the closest hazmat station to the Project site. Response times from this station to the Project site would range from 90 minutes to 2 hours (Betty's, 2009).

9.3 LEAK DETECTION AND REMOVAL SYSTEM [21600(B)(8)(C)]

In accordance with Title 27 CCR Section 21600(b)(8)(C), there is a LDRS located beneath the primary liner in the evaporation pond. As outlined in **Section 6.1.6**, the LDRS will be located between the primary and secondary liners underlying the each evaporation pond (refer to **Figure 12**). The LDRS will comprise of a layer of geonet and a perforated collection piping system which will be sloped to leak detection sump in each evaporation pond. The leak detection sump will include a 16-inch diameter leak detection and removal well fitted an electronic leak sensor and a submersible pump to allow removal of leakage. The pump will discharge back into the

evaporation pond. The discharge pipe may be equipped with a recording flow totalizer to allow monitoring of the amount of fluid removed over time and calculation of leakage rates.

The inspection and maintenance requirements for the LDRS are outlined in **Section 10**.

9.3.1 ACTION LEAKAGE RATE

The action leakage rate (ALR) is the allowable leakage from the primary liner system above which contingency actions are triggered. According to CFR Title 40, Section 264.222, the ALR is defined as “...the maximum design flow rate that the leak detection system can remove without the fluid head on the bottom liner exceeding 1 foot”. The ALR must also include an adequate safety margin to allow for variability in the containment system design (e.g. liner and collection pipe slope, interstitial fill hydraulic conductivity, thickness of drainage material).

The estimated ALR for the evaporation ponds is 2,750 gallons per acre per day (refer **Appendix B**). This is based on one standard hole per acre, a drainage layer geonet with hydraulic conductivity of 0.06 m/s and a 50% safety factor. The assumption underlying this ALR calculation will be verified in the actual constructed ponds. Based on an 8 acre pond, each evaporation pond would have an ALR of 2,200 gallons per day. However the ALR will need to have field verification as this rate will vary depending on actual drainage material used and its hydraulic conductivity. A final ALR will be submitted to the CRBRWQCB within six months of effective date of the permit based on field analysis.

A large hole in the geomembrane may cause a rapid large leakage rate (RLLR) of approximately 9,500 gallons per acre per day (refer **Appendix B**). This would equate to a RLLR of 76,000 gallons per day per pond. The RLLR is provided herein for informational purposes only.

The recording flow totalizer at each sump will be monitored at least weekly to determine the leakage rate through the primary liner. If the leakage rate exceeds the ALR, then the appropriate actions in the Contingency Plan will be implemented.

9.4 DUST CONTROL [21600(B)(8)(D)]

An Operations Dust Control Plan will be prepared for the Facility as specified in the AFC to manage fugitive dust emissions and comply with the requirements of Title 27 CCR Section 21600(b)(8)(D). BMPs for dust control from the evaporation ponds will be implemented as necessary and will include the following:

- Maintaining at least 2 feet of freeboard during operation of the ponds to reduce potential for dust entrainment;
- Ponds allowed to evaporate to dryness;
- Use of moisture conditioning during removal and loading of accumulated sludge;
- Adherence to speed limits during travel on dirt roads for monitoring and maintenance of the ponds; and
- Tarping of any truck loads of sludge removed from the Facility for off-site disposal.

9.5 VECTOR CONTROL [21600(B)(8)(E)]

In accordance with Title 27 CCR Section 21600(b)(8)(E), a vector control program will be implemented at the Facility as needed.

9.5.1 PESTS

In the event that there is a vector problem such as flies or rodents, the Facility will take the adequate steps to control the problem, which may include trapping, acoustic controls, poison, spraying or engaging a licensed pest control service. Integrated pest control practices will be utilized when practical. Brush will be cleared for a distance of at least 30 feet from the ponds, to reduce habitat for rodents and hiding places for predators that could prey on birds attracted to the ponds.

9.5.2 WATERBIRDS

Waterfowl and other birds may be attracted to the evaporation ponds. The use of anti-perching devices around the perimeter of each pond would assist in excluding ravens and other birds from accessing the edge of the ponds to drink any of the water. Additionally, operational design of the ponds is such that a minimum freeboard of two feet would be kept at all times and the interior slopes of the ponds would be at a 33 percent (3:1, horizontal: vertical). These project design features would make it difficult for perching birds and/or shorebirds to access the water, and are anticipated to minimize risk to wildlife by minimizing availability of water as a new subsidy.

Because the ponds will remain uncovered to maximize evaporation and to avoid trapping birds under netting or monofilament arrays, it is anticipated that primarily waterfowl, such as ducks and geese, would be able to access the evaporation ponds by landing on the water. Waterfowl are anticipated to be the highest risk category; the management response below focuses on both waterfowl and shorebirds.

A concern to waterbirds is the formation and accumulation of salt crystals from hyper-saline conditions on the feathers of waterfowl, which impedes their ability to fly by weighing down the affected bird and potentially resulting in salt toxicosis (i.e., poisoning) (Woebser and Howard 1987, Gordus et al. 2002). Evidence suggests that salinity levels are not the sole determining factor in the potential for salt encrustation on waterfowl. Studies have shown that the formation of salt crystals on hyper-saline ponds is typically associated with water temperatures at or below 4 degrees Celsius (39 degrees Fahrenheit) (Woebser and Howard 1987, Gordus et al. 2002). It is not anticipated that water temperatures will consistently drop to this level of concern; however, due to moderate morning air temperatures recorded (60-70 degrees Fahrenheit) in the vicinity, salt encrustation may occur above this temperature range.

Salt toxicosis via salt ingestion may also occur from overexposure to hyper-saline waters when alternative freshwater sources are unavailable or limited (i.e., during drought conditions) and birds become dependent on a hyper-saline water supply (Gordus, Shivaprasad, Swift 2002). Based on the biological monitoring associated with the evaporation ponds at the Harper Lake SEGS, an established facility with the same solar energy process, salt encrustation and salt toxicosis have been a rare occurrence.

9.5.3 POND MANAGEMENT

Measures that would be taken, as necessary, to keep birds from using the ponds include:

- In the event that climatic conditions are such that evaporation must be increased to maintain pond levels below the freeboard limits, evaporative disposal nozzles (see for example <http://www.bete.com/applications/disposal.html>) will be used to increase wastewater evaporation rates.
- Initiate use of an air canon in order to haze waterfowl, and frighten them away from the evaporation ponds. The air canon would be stored onsite, but only used under this circumstance, since birds may become acclimated to the disturbance caused by air canon hazing, if used on a regular basis. The air canon would be used until the evaporation process was completed in the pond, or until the crystallized salts returned to solution.
- Deploy "Bird-B-Gone Balloon" (a visual scare device) or other hazing devices into the pond, to discourage waterfowl from landing on the pond.

The Project also will include a monitoring program that incorporates monitoring of bird populations at the evaporation ponds and monitoring water quality in the ponds for TDS. The monitoring program will consider the following factors:

- TDS concentrations in evaporation pond water;
- Pond water levels, temperature and salinity;
- Bird species utilizing the ponds; and
- Nesting activities at the ponds.

If significant adverse effects to birds are observed during the evaporation pond monitoring, and those effects are determined to be the result of salt toxicity (by autopsy of deceased birds), additional monitoring may be needed to further assess impacts to bird species, including collection of additional water samples to analyze for TDS.

Reporting requirements are outlined in **Section 12.2**.

9.6 DRAINAGE AND EROSION CONTROL [21600(B)(8)(F)]

A preliminary DESCP has been prepared for the Facility as specified in the AFC to address the requirements of Title 27 CCR Section 21600(b)(8)(F). The plan outlines the management and control of storm water runoff at the site and specifies BMP's for erosion and sediment control that will include side slope protection of the berms surrounding the evaporation ponds. An outline of the drainage design and BMPs is provided in **Section 7**.

9.7 NOISE CONTROL [21600(B)(8)(H)]

Noise control requirements for the Facility have been investigated in the AFC and will comply with the requirements of Title 27 CCR Section 21600(b)(8)(H). Due to the remoteness of the site and

operating procedures of the treatment units, noise is not anticipated to be a problem (nearby residences are approximately 12 miles east of the site). Offsite noise levels for the operation of the entire Facility diminish to the point of being indistinguishable from ambient levels before reaching the offsite noise sensitive or residential receptors. The Facility operator will comply with Local, State, and Federal requirements and regulations regarding noise control.

On-site mobile equipment used for pond maintenance will be equipped with approved mufflers and will conform to applicable OSHA and CAL OSHA noise requirements. In addition, hearing protection will be available to facility personnel.

9.8 TRAFFIC CONTROL [21600(B)(8)(I)]

Traffic control requirements for the Facility have been investigated in the AFC and will meet the requirements of Title 27 CCR Section 21600(b)(8)(I) for the evaporation ponds. The proposed access to the evaporation pond and LTU will be off the main paved entrance roadway for the Facility. Traffic is expected to be limited to trucks and mobile equipment used in occasional inspection and maintenance activities. Control measures to mitigate on-site safety hazards and interference with site operations will include signs, paint markings, mirrors and imposition of speed limits as needed.

Major highways located around the project site include CA-62 to the north, U.S. 95 to the east, I-10 to the south, and CA-177 to the west. Several un-maintained dirt roads traverse the site. Access to the project site is best off one of the main highways, onto the dirt roads.

Evaporation pond and LTU operation and maintenance activities represent a minimal contribution to the total traffic entering and leaving the Facility.

9.9 HAZARDOUS WASTE [21600(B)(8)(J)]

There will be a variety of chemicals stored and used during construction and operation of the project. The storage, handling, and use of all chemicals will be conducted in accordance with applicable laws, ordinances, regulations, and standards.

Hazardous materials will be stored in proper containers in material yards and designated construction areas. Cleanup materials (spill kits) will also be stored in these areas. Fuel, oil, and hydraulic fluids used in on-site vehicles will be transferred directly from a service truck to construction equipment and will not otherwise be stored on site.

Designated, trained service personnel will perform fueling either prior to the start of the workday or at completion of the workday. Service personnel and construction contractors will follow SOPs for filling and servicing construction equipment and vehicles.

Any HTF impacted soil classified as hazardous will be removed from the LTU staging area after the initial characterization. The evaporation ponds will not contain hazardous wastewater or sludge as it is illegal to discharge hazardous waste into surface impoundments under the Toxic Pits Cleanup Act of 1984.

10. INSPECTION, SAMPLING AND MAINTENANCE PROGRAMS [21760(B)]

The following section outlines the inspection and maintenance requirements for the evaporation pond system and LTU.

The ALR will be field tested at the commencement of the evaporation pond operation. On the first day of operation, the pump, piping and control switches will be checked to ensure they are in proper working condition per the manufacturers' specifications.

10.1 INSPECTION PROGRAM

10.1.1 EVAPORATION POND LINER AND DIKE AREAS

The exposed area of the evaporation ponds shall be inspected on a monthly basis. As the liner system will not be exposed, this will include observations for displaced or degradation of the hard/protective layer, and observations for eroded areas within the berm systems. The perimeter fence and the pond inlet (when visible) and outlets should also be inspected monthly to ensure they are in good repair and that these areas are free of debris.

10.1.2 EVAPORATION POND LEAK DETECTION SYSTEM

Monitoring of leaked water is achieved through the addition of vertical monitoring wells that are hydraulically isolated with the leak detection layer. The flow totalizes, which quantify flow and the potential leakage that may occur between containment layers in the monitoring wells, should be monitored weekly for flow and monthly (quarterly after the first six months) to check for built up of material or degradation of the system.

10.1.3 SLUDGE INSPECTIONS AND REMOVAL

Monthly inspections of the pond inlet, outlet, and all associated drainage ditches/pipes/culverts will be conducted for sludge including sediment and debris accumulation. If sludge appears to be impeding flow into the pond or potential flow from the pond, maintenance actions will be scheduled for cleaning these areas as soon as possible. Sludge removal activities will be conducted when sludge is accumulated to a depth of three feet, measured upon the inspections and the process is outlined in **Section 10.3.1**.

10.1.4 AVIAN PROTECTION

Each actively used evaporation pond will be outfitted with a level gauge for daily water level measurements, a hydrometer for daily salinity measurements, and a direct reading thermometer with the temperature data recorded at least diurnally. If the average overnight water temperature in the active evaporation ponds is at or below 4 degrees Celsius, the Environmental Compliance Manager (ECM) will conduct a visual survey of the ponds immediately upon the following morning. If upon inspection of the active ponds, the ECM observes evidence of recent substantive increases in salt crystallization anywhere within the pond (e.g., at or near the

waterline), or if water levels in any of the ponds are observed to fall below a minimum depth of two foot (which would cause elevated levels of TDS), the ECM will route all of the wastewater into one or two ponds to increase the pond volume and lower the average salinity within the pond(s). At the same time, the remaining pond or ponds will be pumped dry. The pond to which the combined flow is discharged during this time will be rotated each year, periodically as needed, so that water levels do not rise too high and minimum freeboard requirements are met.

10.1.5 LAND TREATMENT UNIT

Inspection of the LTU will be conducted monthly. The inspection will involve visual observation to identify the potential presence of cracks or subsidence in the base soil layer that would allow penetration of contaminants. The perimeter earthen berms will be inspected to ensure they in good repair and that these areas are free of debris and accumulated sediment. Inspection of the effectiveness of general housekeeping, run-on controls, and the soil piles for odors and fugitive dust may be required for regular maintenance.

10.2 SAMPLING PROGRAM

Samples are to be properly documented and a written record of the chain-of-custody recorded. The chain-of-custody record will track the samples from the field to the laboratory. This form documents the time, date, location, person collecting the sample, and names and signatures of all persons handling the samples from the field to the laboratory.

10.2.1 EVAPORATION POND – WASTEWATER

The evaporation ponds will be sampled at the commencement of operation, semi-annually thereafter to document constituent concentrations. Grab samples of wastewater collected at the start of operation and annually from each pond will be analyzed by a state certified laboratory to determine the concentration of the parameters listed in **Table 9**. The annual samples are to be collected in the last quarter of each year.

Wastewater samples from each pond will also be collected semi annually and composited into one same by the state certified laboratory and analyzed to determine the quantification of the parameters list in **Table 10**.

In addition, quarterly water quality testing of TDS will be undertaken in conjunction with qualitative behavioral and avian health monitoring. Individual water samples will be taken from each pond. Should bird mortality occur, an additional water grab sample will be collected from the ponds for analysis at the time of discovery. Because water quality is difficult to tie directly to ecological risk by implementation of numeric standards, TDS concentrations will not trigger remedial action; however, the data will be collected to assess potential long-term correlations between water quality, as well as the pond water level, pond salinity, and temperature data, and bird behaviors and mortality, if any.

10.2.2 EVAPORATION POND – SLUDGE

Annually, in the last quarter to each year, two representative grab samples of the bottom sludge in each pond if present, will be collected, composited and analyzed for the parameters show in **Table 11**.

10.2.3 LAND TREATMENT UNIT WASTEWATER

The wastewater from the LTU will also be sampled periodically to assess the HTF content. Grab samples of run off from LTU will be sampled prior to the discharge into the Evaporation Pond. Samples will be analyzed by a state certified laboratory to determine the concentration of the parameters in **Table 12**.

10.2.4 LAND TREATMENT UNIT SOIL

As described in **Section 6.4**, representative soil samples will be collected for every batch of HTF contaminated soil undergoing treatment in the LTU and composited according to methods specified in EPA SW-846 (refer **Table 13**). Results of the samples will be reported semiannually.

Annually, soil samples will be collected at a depth of 1 foot below the compacted soil base at the LTU (approximately 3 feet below ground level) and analyzed for HTF using modified EPA Method 8015 to verify that HTF is not migrating below the 5-foot treatment zone underlying the unit. If results of sample analysis indicate HTF concentrations greater than the laboratory detection limit, soil sample collection will be repeated at 1-foot intervals until laboratory analytical results show that concentrations are less than the laboratory detection limit. If HTF concentrations above the laboratory detection limit are found below the 5-foot treatment zone, the Facility will implement the Contingency Plan and Corrective Action Plan and submit a letter to the CRBRWQCB highlighting the “evidence of a release.” Results of sample analysis will be reported annually.

10.3 MAINTENANCE PROGRAM

10.3.1 EVAPORATON POND

The ponds are designed to hold the three feet of sludge/precipitated solids, which is estimated to be accumulated every seven years. In addition, pond clean out may be to support unscheduled maintenance, repairs or contingency responses. The general requirements for undertaking clean out works for evaporation ponds are outlined below.

Before water can be pumped out of the pond for maintenance, the capacity of the other evaporation ponds must be assessed to verify that sufficient capacity exists to contain wastewater from continued operation for a sufficient amount of time to allow planned maintenance activities. Preliminary design estimates indicate that if one pond is undergoing clean out activities, the additional two ponds can operate effectively for up to one year.

A manually placed pumping system should be used to transfer the water into an adjacent evaporation pond. As the ponds are covered with a hard protective layer, it will be possible to place and activate these pumping systems without otherwise damaging the pond liners or transfer

pipng. During pond drainage, the flow rates from the pumps should be monitored to ensure that the outflow is not negatively impacting on the receiving evaporation pond. Details of this pumping system must be provided by the manufacturer.

The precipitated solids shall be removed by a pumping or vacuum system if in a fluid state, or should be dried and removed using conventional excavation and loading equipment light enough to reduce the potential for damage to the liner system. If necessary, the sludge should be sampled and analyzed to meet the characterization requirements of the receiving disposal facility. The characteristics of the sludge will determine the transportation and disposal methodology.

The appropriate time of year and ideal weather conditions to undertake the clean out activities should be investigated. Dust generated during the activities will need to be controlled in accordance with the Facilities Operations Dust Control Plan. Health and safety issues for the clean out activity include potentially slipping or falling into the pond. As part of the Facilities Operations Safety Training Program and PPE Plan, employees will be trained on how to undertake the clean out activities in a safe manner, which may include having ropes and ladders accessible at the evaporation ponds.

10.3.2 LAND TREATMENT UNIT

Maintenance involved with the LTU will include general housekeeping and drainage system maintenance. General housekeeping within the LTU includes the following:

- Keeping soil piles tidy and contained;
- Clearing the unit of debris that may have been accumulated during operation;
- Re-applying plastic sheeting on soil piles; and
- Moisture conditioning and fertilizing the soil piles as needed.

Drainage system maintenance will include the following:

- Re-grading of the base of the LTU; and
- Repair/replacement of earth berms as needed.

10.4 AVIAN MONITORING

Avian monitoring at the evaporation ponds would be conducted twice monthly for the first 2 years of project operation. The Project ECM will continue monitoring after the first two years, under the direction of Genesis Solar, LLC. The monitor (appointed biologist or ECM) would identify bird species and/or functional groups (e.g., waterfowl, waders, shorebirds, upland shorebirds) utilizing the ponds, record the behavior of the birds (e.g., feeding, swimming, wading, nesting), and note any mortalities or physical infirmities (e.g., birth defects or reduced growth) associated with any bird observed on or adjacent to the evaporation ponds. Any dead bird that can be safely retrieved from the evaporation ponds would be collected by a biologist or ECM and sent to a qualified laboratory to determine if the mortality was directly related to salt toxicosis or encrustation. Documented mortality resulting from salt toxicosis or encrustation would result in corrective measures implemented in coordination with the agencies.

10.5 MOISTURE DETECTION MONITORING

There will be a pipe installed under each evaporation pond to check for the presence of excessive moisture or liquids on a semi-annual basis using a neutron probe. This moisture detection monitoring program must be undertaken by a trained, certified and licensed technician as the neutron probe uses radioactive material.

Moisture in the soil is detected by the speed that the neutrons move and scatter when emitted. The soil causes neutrons to slow however if the soil is dry, the cloud of neutrons will be less dense and extend further from the probe and if the soil is wet, the neutron cloud will be more dense and extend a shorter distance (Risinger & Carver 2009).

The density of the cloud is measured by a detector and results are displayed electronically on the front panel. The measurement is the total water content in the soil, therefore the background levels of water moisture in the soil must be removed to assess if any additional moisture has been released from the evaporation pond liner system (Risinger & Carver 2009).

Prior to the discharge of any waste water into the ponds, soil moisture measurements will be taken to establish background soil moisture levels. Neutron probe measurements will be taken beneath each pond at least four times in order to determine a value that is statistically representative of background moisture conditions.

Once the evaporation ponds become operational and wastewater is discharged to the ponds, moisture detection monitoring will be performed on a semi-annual basis. For each monitoring event neutron probe measurements will be performed beneath each pond. A statistical analysis will be performed comparing the results to the background soil moisture level using the statistical methods (refer to **Appendix C**). If the moisture content is statistically significantly higher than the background value, then field verification testing will be performed and the CRBRWQCB will be notified with a report of physical evidence of a release. Field verification testing may consist of a combination of the following measures: additional neutron analysis, laboratory analysis of liquids drawn from the neutron probe casing, and visual observation to verify existence of a release.

11. CONTINGENCY PLAN

Under *Title 27 Environmental Protection, Division 2 Solid Waste, Subdivision 1, Chapter 4, Subchapter 3, Article 4, Section 21760(b)(2)*, a contingency plan is required for the failure or breakdown of handling facilities or containment systems.

This contingency plan is for the evaporation ponds and land treatment unit only. It shall be maintained at the Facility, and where-ever the day to day decisions regarding operation occur. Genesis Solar LLC shall promptly revise the contingency plan upon any change of information contained in the plan.

The following sections outline responses required, depending on the failure or breakdown of the system. Refer to **Appendix C** for the Groundwater Detection Monitoring Requirements. Section **12.3** contains the reporting requirements to the CRBRWQCB for unscheduled activities.

11.1 EVAPORATION POND – FREEBOARD LIMIT

In the event that there is less than 2 feet of freeboard in an evaporation pond, discharge into the evaporation pond shall cease or be decreased as soon as practical. The applicable pond shall then not be used until the water evaporates to a satisfactory level.

Within five days, the cause of the incident shall be evaluated and operational conditions adjusted as necessary to avoid future occurrences.

All remedial actions shall be recorded in the Facility log (refer to **Section 8.1**).

11.2 EVAPORATION POND - ACTION LEAKAGE RATE

The flow totalizer in the evaporation pond monitoring well quantifies the flow and leakage between the containment layers. In the event that the ALR is exceeded, the magnitude and extent of the leak shall be evaluated and reported to the CRBRWQCB with a repair schedule (refer **Section 12.3.2**).

11.3 EVAPORATION POND – LINER FAILURE

In the event of a liner failure, berm failure or a loss of fluid, all discharge into the evaporation pond shall cease or reduce as soon as practical. In addition, the following steps are to be undertaken:

- Collect and analyze representative samples for the parameters in **Table 9**;
- Investigate the source the cause of the failure, and current condition of the evaporation pond and liner system. Repairs shall be undertaken as necessary. The evaporation pond shall not commence operation until the repairs are completed;
- Undertake an assessment on any applicable surrounding subsoil and/or groundwater to determine the impacts of the failure; and

- Record all work, including repair procedures and material used, in the facility log and available for CRBRWQCB for review.

As a contingency during emergency pond repair, the use of cooling tower blow down for dust suppression may be required. This is intended for short term use only in conjunction with a liner repair system and CRBRWQCB shall be notified for approval prior to commencement of work. A request may also be submitted to the CRBRWQCB to use cooling tower blow down for dust suppression in the event of extreme drought conditions to reduce the use of well water on a temporary basis.

11.4 EVAPORATION POND – OVERTOPPING OF PONDS

In the event of an evaporation pond overtopping, discharge into the pond shall cease as soon as practical. In addition, the following steps are to be undertaken:

- As soon as practical, excess wastewater shall be removed from the area and the water level in the evaporation pond restored to at or below the freeboard level. Disposal of the wastewater shall be undertaken by a licensed waste hauler and transported to an approved disposal facility, abiding by all federal, state and local requirements;
- Representative samples shall be collected and analyzed for the parameters in **Table 9**, and results reported to the CRBRWQCB;
- Initiate an investigation into the source the cause of the overtopping; and
- Undertake an assessment on any applicable surrounding subsoil and/or groundwater shall be undertaken to determine the impacts of the overtopping. If the overtopping impacts the COC limits in the point of compliance well, the Corrective Action Plan shall be undertaken to address the required remedial actions, monitoring and schedule for completion (refer to **Appendix D**).

11.5 UNAUTHORIZED DISCHARGE

Any unauthorized discharge, results of the investigation, and any correction actions taken shall be reported to the CRBRWQCB (refer **Section 12.3** for reporting requirements).

11.5.1 HAZARDOUS MATERIAL AND IMMINENT THREAT

The Office of Emergency Services shall be notified immediately by Genesis Solar LLC for unauthorized discharges of hazardous materials or for an imminent and substantial endangerment to the public health or environmental caused by a discharge or threatened waste discharge.

The area of the discharge shall be isolated and follow-up medical treatment undertaken as necessary.

11.5.2 NON HAZARDOUS MATERIAL

For unauthorized discharges or threatened waste discharges that do not cause an immediate threat to the public health or environment, CRBRWQCB shall be contacted within 24 hours of discovering the non-hazardous material that has the potential to cause a COC to be exceeded.

The area of the discharge shall be isolated, material disposed as appropriate, and the site remediated as soon as possible.

Leaks or spills of HTF may occur during additions / removals of HTF in the solar field, maintenance activities and unexpected system failures. When a spill or leak of HTF fluid is identified, the affected soil will be cleaned up within 48 hours (refer to **Section 6.4.2**) for process details).

If there are problems with HTF conveyance equipment, the appropriate parts shall be isolated and repaired. In addition, preventative measures shall be undertaken, including equipment and soil inspections and equipment or system tests. Preventative maintenance activities will reduce the corrective measures undertaken after a problem occurs.

If HTF is found below the treatment zone within the LTU during sampling, the followings steps shall be undertaken;

- Isolate the area within the LTU and cease operation;
- Undertake sampling to investigate the extent of the contamination;
- Remove the affected soil and relocate to another section of the LTU;
- Rehabilitate the affected area by replacement of native soil with un-impacted HTF native soil; and
- Resume LTU activities and sample after one month to ensure additional migration has not occurred.

12. RECORD KEEPING AND REPORTING PROGRAM

12.1 GENERAL REPORTING

12.1.1 SEMI-ANNUAL REPORT

A semi-annual monitoring report will be submitted to the CRBRWQCB containing the results from the sampling of the evaporation ponds. Subsequent semi-annual monitoring reports will be submitted to the CRBRWQCB by June 31st of each year.

A detection monitoring report (refer **Appendix C**) will be submitted to the CRBRWQCB on a semi-annual basis and will include the following:

- Results of sampling analysis, including statistical limits for each monitoring point;
- A description and graphical presentation of the velocity and direction of groundwater flow under/around the Project, based upon water level elevations taken during the collection of the water quality data submitted in the report;
- A map or aerial photograph showing the locations of observation stations, monitoring points, and background monitoring points;
- An evaluation of the effectiveness of the leakage monitoring and control facilities, and of the runoff/run-on control facilities; and
- A letter transmitting the essential points in each report, including a discussion of any permit excursions found since the last report was submitted and actions taken or planned for correcting those excursions. If Genesis Solar LLC has previously submitted a detailed time schedule for correcting permit excursions, a reference to the correspondence transmitting this schedule will be satisfactory. If no excursions have occurred since the last submittal, this shall be stated in the letter of transmittal.

12.1.2 ANNUAL REPORT

By January 31st of each year, Genesis Solar LLC will submit an Annual Report to the CRBRWQCB including the preceding information plus the results of the annual sampling of the evaporation ponds and LTU with the following information:

- Evidence that adequate financial assurance for closure, post-closure, and reasonably foreseeable releases is still in effect and may be verified by including a copy of the renewed financial instrument or a copy of the receipt for payment of the financial instrument;
- Evidence that the amount is still adequate or if not, that the amount of financial assurance has been increased by the appropriate amount, due to inflation, a change in the approved closure plan, or other unforeseen events; and
- A review of the closure plan and a statement that the closure activities described are still accurate or an updated closure plan.

12.2 VECTOR CONTROL REPORTING REQUIREMENTS

At the conclusion of every operational year, the ECM will prepare a report for submittal to the CEC Compliance Project Manager (CPM), summarizing the results of the various tests and monitoring efforts, described as a part of the evaporation pond monitoring plan. The summary report will include copies of the water quality tests, a chronological listing of the overnight water temperatures, water levels and salinity measurements for the active evaporation ponds, and any results of necropsies performed on birds salvaged from in or around the ponds.

Recommendations for changes to the monitoring program or pond management approach will be made, as warranted.

12.3 UNSCHEDULED REPORTS TO BE FILED WITH THE REGIONAL BOARD

Incidents that result in implementation of the Contingency Plan will be reported to the appropriate agencies. If such incidents threaten to result in an off-site discharge or may present a potential threat to human health or the environment, immediate verbal notification shall be made as specified in the Contingency Plan. A record of such verbal communications will be maintained in the operating record. As specified by State and Federal regulations, a written report describing the incident and the implementation of the Contingency Plan will be prepared and submitted to LEA and CRBRWQCB within 15 days. Additional reporting may be required under the WDR and Monitoring and Reporting Program established by the CRBRWQCB. Further discharge situations are outlined in the following sections.

12.3.1 RELEASE FROM THE EVAPORATION PONDS

The CRBRWQCB will be immediately notified (verbally) whenever a determination is made that there is a physical or statistically significant evidence of a release from the evaporation ponds. The verbal notification will be followed by a written notification, via certified mail, within seven days of such determination. The notification shall include the following information:

- Evaporation pond that may have released or be releasing;
- General information including the date, time, location and cause of the release;
- An estimate of the flow rate and volume of the waste involved;
- A procedure for collecting samples and description of laboratory tests to be conducted;
- Identification of any water bearing media affected or threatened;
- A summary of proposed corrective actions; and
- For statistically significant evidence of a release - monitoring parameters and/or constituents of concern that have indicated statistically significant evidence of a release from the evaporation pond; or
- For physical evidence of a release - physical factors that indicate physical evidence of a release.

Upon notification, Genesis Solar LLC may initiate verification procedures or demonstrate that source other than the evaporation ponds, caused the evidence of a release. A supporting technical report must be provided to the CRBRWQCB within 90 days demonstrating the different source of the discharge.

12.3.2 EXCEEDING THE ACTION LEAKAGE RATE

If the ALR is exceeded, the CRBRWQCB will be notified within 24 hours whenever of the determination. The verbal notification shall be followed by a written notification via certified mail, within seven days of such determination. This written notification shall be followed by a technical report via certified mail within thirty days of such determination. The technical report shall describe the actions taken to address the adverse condition, and shall describe any proposed future actions to abate the adverse condition.

12.3.3 HEAT TRANSFER FLUID SPILL OR LEAK

HTF spill or leak reporting requirements for the Facility will be incorporated into the Spill Prevention Control and Countermeasure (SPCC) Plan for the Project as follows:

- Facility personnel will be required to submit an internal report detailing a HTF spill, regardless of size.
- A release of 20 gallons is reportable to the CEC.
- A release of 25 gallons is reportable to the CRBRWQCB.
- A release of 42 gallons is a reportable quantity (RQ) to the National Response Center.

12.3.4 MATERIAL CHANGE

Pursuant to California Water Code Section 13260 (c), Any proposed material change in the character of the waste, manner or method of treatment or disposal, increase of discharge, or location of discharge, shall be reported to the Regional Board at least 120 days in advance of implementation of any such proposal. This shall include, but not be limited to, all significant soil disturbances.

13. STANDALONE DOCUMENTS

Under Title 27 Environmental Protection, Division 2 Solid Waste, several documents supporting the RoWD/JTD are to be submitted as standalone documents. These documents have been provided in the Appendix to the RoWD/JTD in the following sections:

- Appendix C – Detection Monitoring Program
- Appendix D – Corrective Action Plan
- Appendix E – Preliminary Closure Maintenance Plan for Evaporation Ponds
- Appendix F - Preliminary Closure Maintenance Plan for the Land Treatment Unit
- Appendix G – Financial Assurance

A Post-Closure Maintenance Plan for the evaporation ponds and LTU are not required as both waste management units will have a clean closure.

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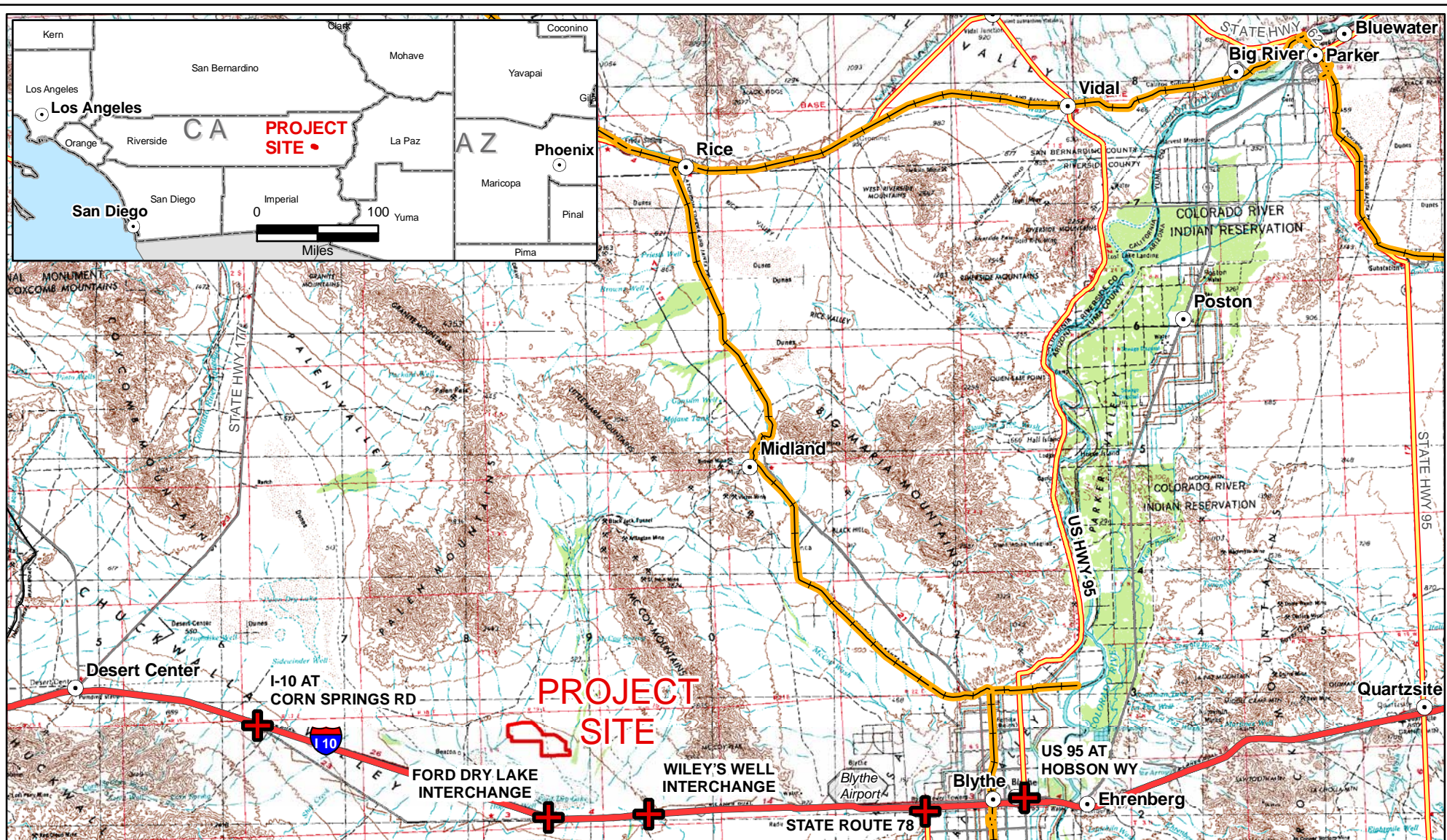
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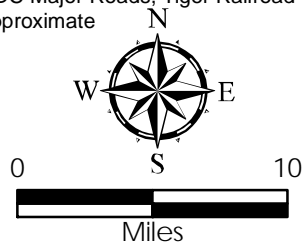
Wilson, R.P., and Owens-Joyce, S.J. 1994. Method to Identify Wells that Yield Water that Will be Replaced by Colorado River Water in Arizona, California, Nevada, and Utah. U.S. Geological Survey, Water Resources Investigation Report 94-4005. 36 pages.

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FIGURES



SOURCE:
USGS 250K Quad Sheet, Salton Sea, Needles
ESRI Cities, SDC Major Roads, Tiger Railroad
All locations approximate



GENESIS SOLAR ENERGY PROJECT



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LOCATION MAP

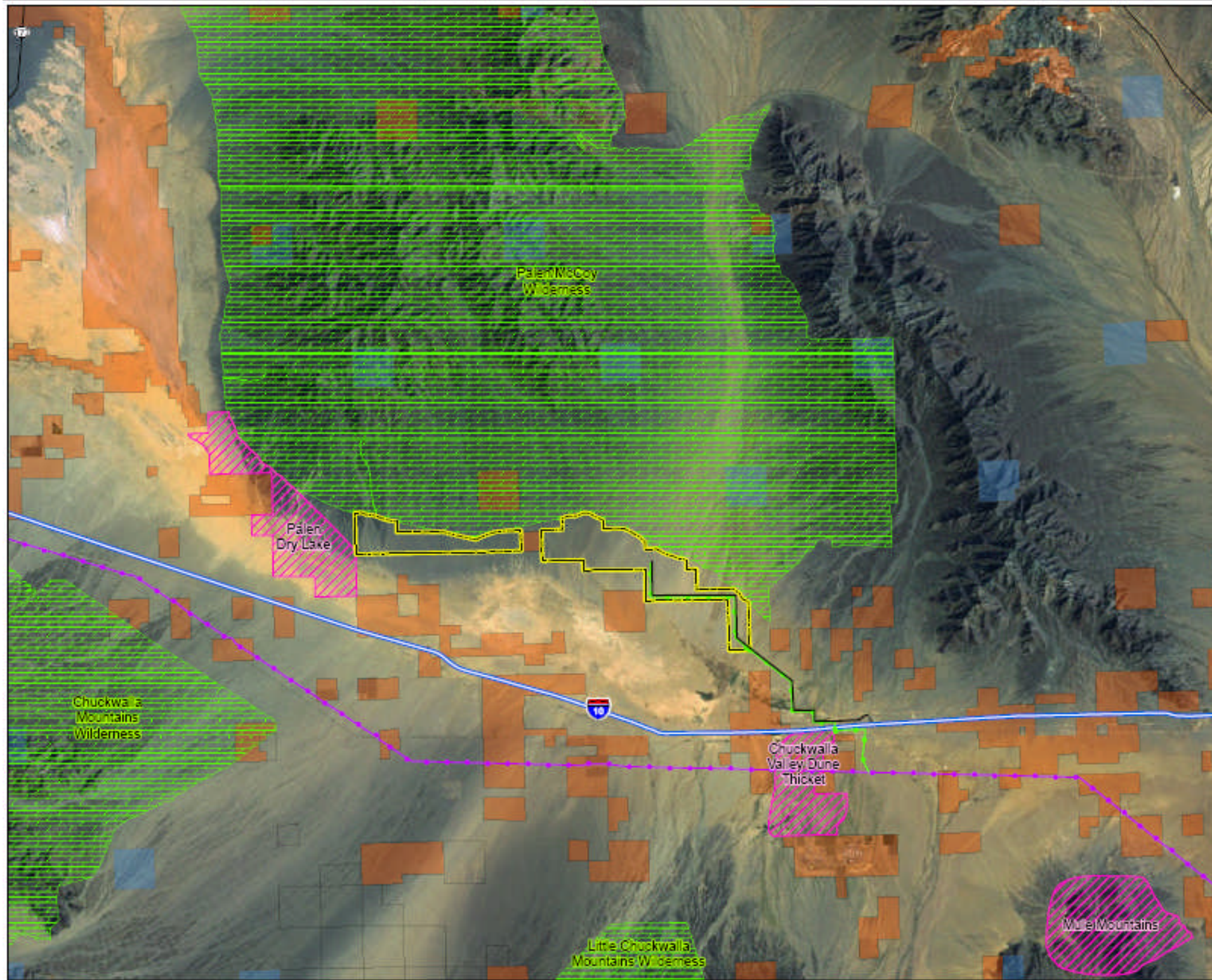
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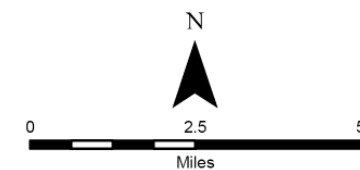
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1



-  Proposed Project Site
 -  Proposed Access Road
 -  Proposed Transmission Line
 -  Blythe Energy Project Transmission Line
 -  Designated Wilderness
 -  Area of Critical Environmental Concern
- Land Owner**
-  Bureau of Land Management
 -  State of California
 -  Other Ownership



Notes:
 (a) UTM Zone 11, NAD 1983 Projection
 (b) Source Data; Tetra Tech Ec Inc,
 ESRO, USGS, BLM, Platts Inc

GENESIS SOLAR LLC
 GENESIS SOLAR ENERGY PROJECT



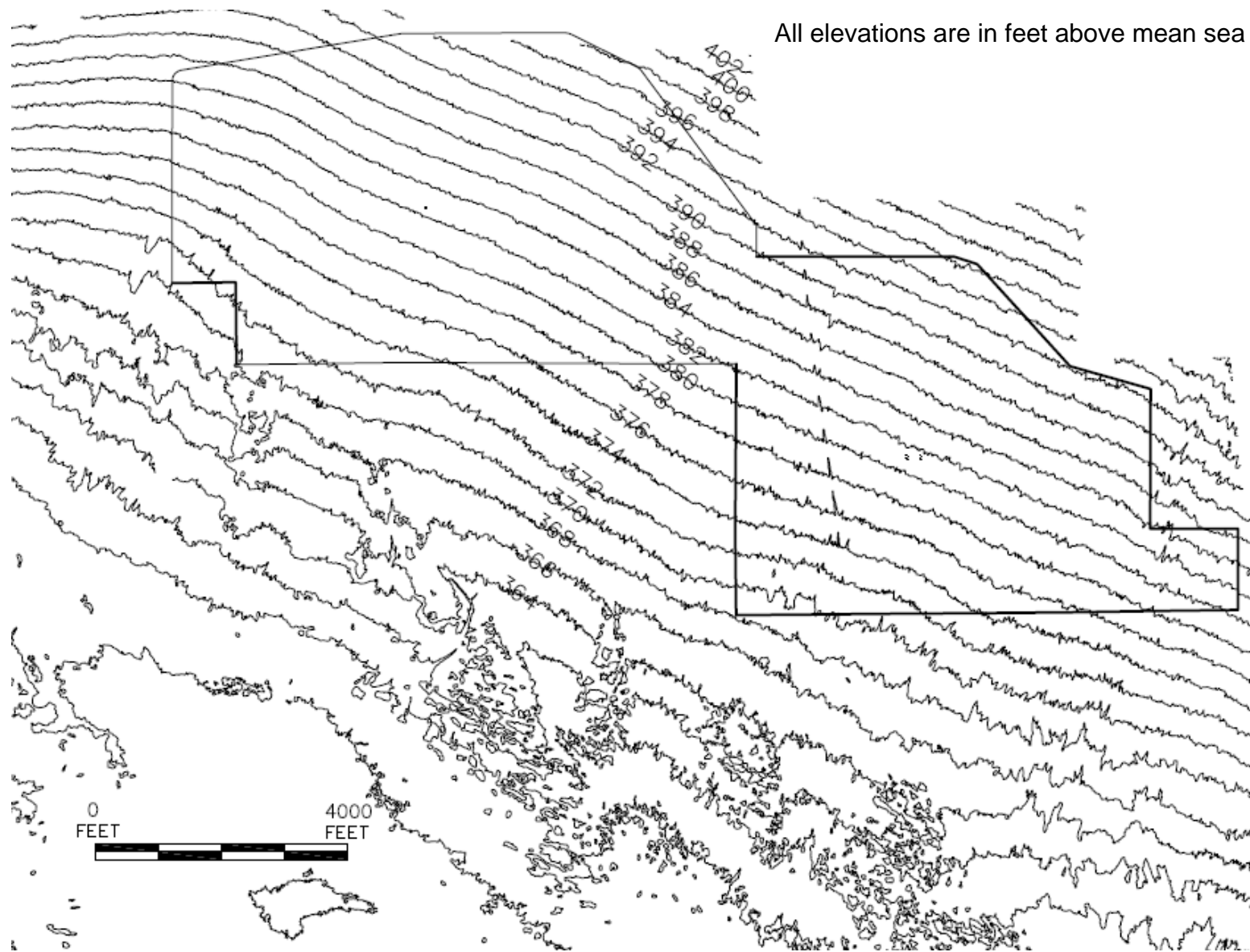
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LAND USE AND OWNERSHIP MAP

08/2009

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2



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GENESIS SOLAR ENERGY PROJECT



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TOPOGRAPHY MAP

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3

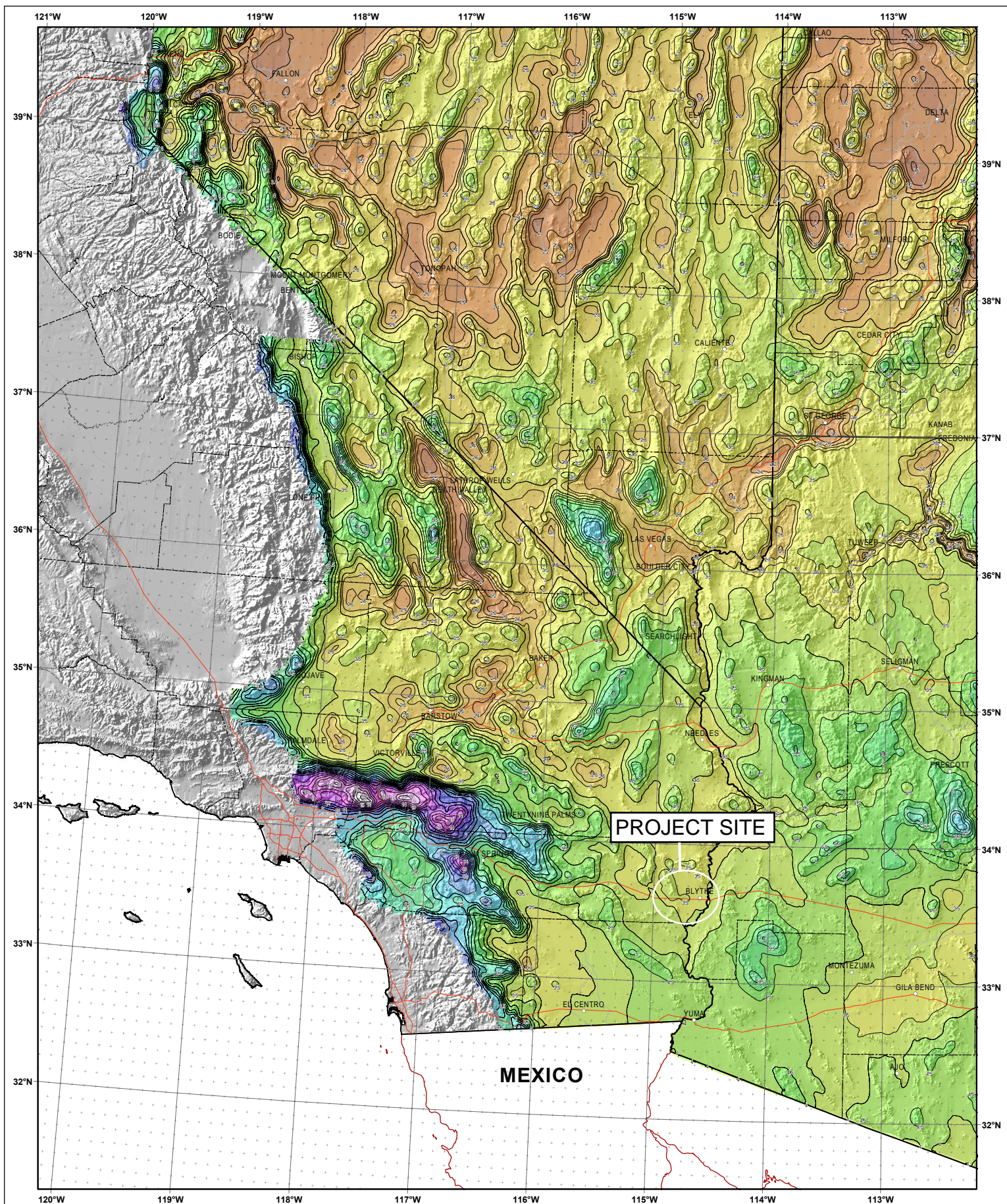
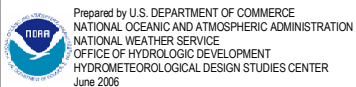


FIGURE 4

SOUTHEASTERN CALIFORNIA

NOAA Atlas 14, Volume 1, Version 4
Semiarid Southwestern United States



Prepared by U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE
OFFICE OF HYDROLOGIC DEVELOPMENT
HYDROMETEOROLOGICAL DESIGN STUDIES CENTER
June 2006

SCALE 1:2,000,000
(when printed/viewed at ANSI C size)
0 10 20 30 40 50 Miles
0 10 20 30 40 50 60 70 Kilometers

Isopluvials of 24 hour precipitation (inches)
with Average Recurrence Interval of 100 years

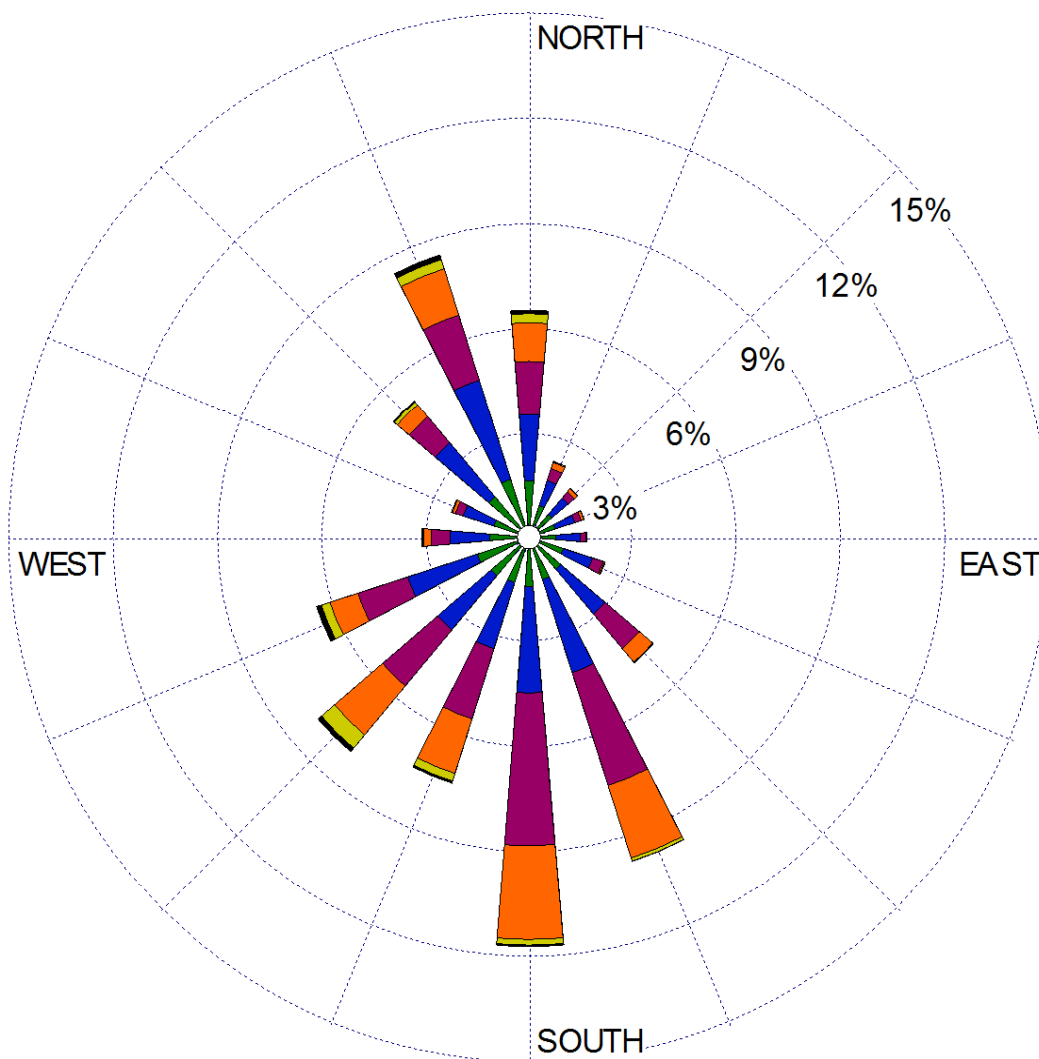
See NOAA Atlas 14 documentation for factors to
convert to Annual Exceedance Probabilities for
all estimates below 25 years



Inches

1.53 - 1.60	2.61 - 2.80	5.01 - 5.50	9.01 - 10.00	15.01 - 16.00
1.61 - 1.80	2.81 - 3.00	5.51 - 6.00	10.01 - 11.00	16.01 - 17.00
1.81 - 2.00	3.01 - 3.50	6.01 - 6.50	11.01 - 12.00	17.01 - 18.00
2.01 - 2.20	3.51 - 4.00	6.51 - 7.00	12.01 - 13.00	18.01 - 19.00
2.21 - 2.40	4.01 - 4.50	7.01 - 8.00	13.01 - 14.00	
2.41 - 2.60	4.51 - 5.00	8.01 - 9.00	14.01 - 15.00	

Projection: Lambert Conformal Conic; Datum: NAD83; Standard Parallels: 38° and 45°; Central Meridian: 112°



Source: Genesis Solar Energy Project,
AFC, Section 5.2 Air Quality, August 2009

GENESIS SOLAR, LLC
GENESIS SOLAR ENERGY PROJECT



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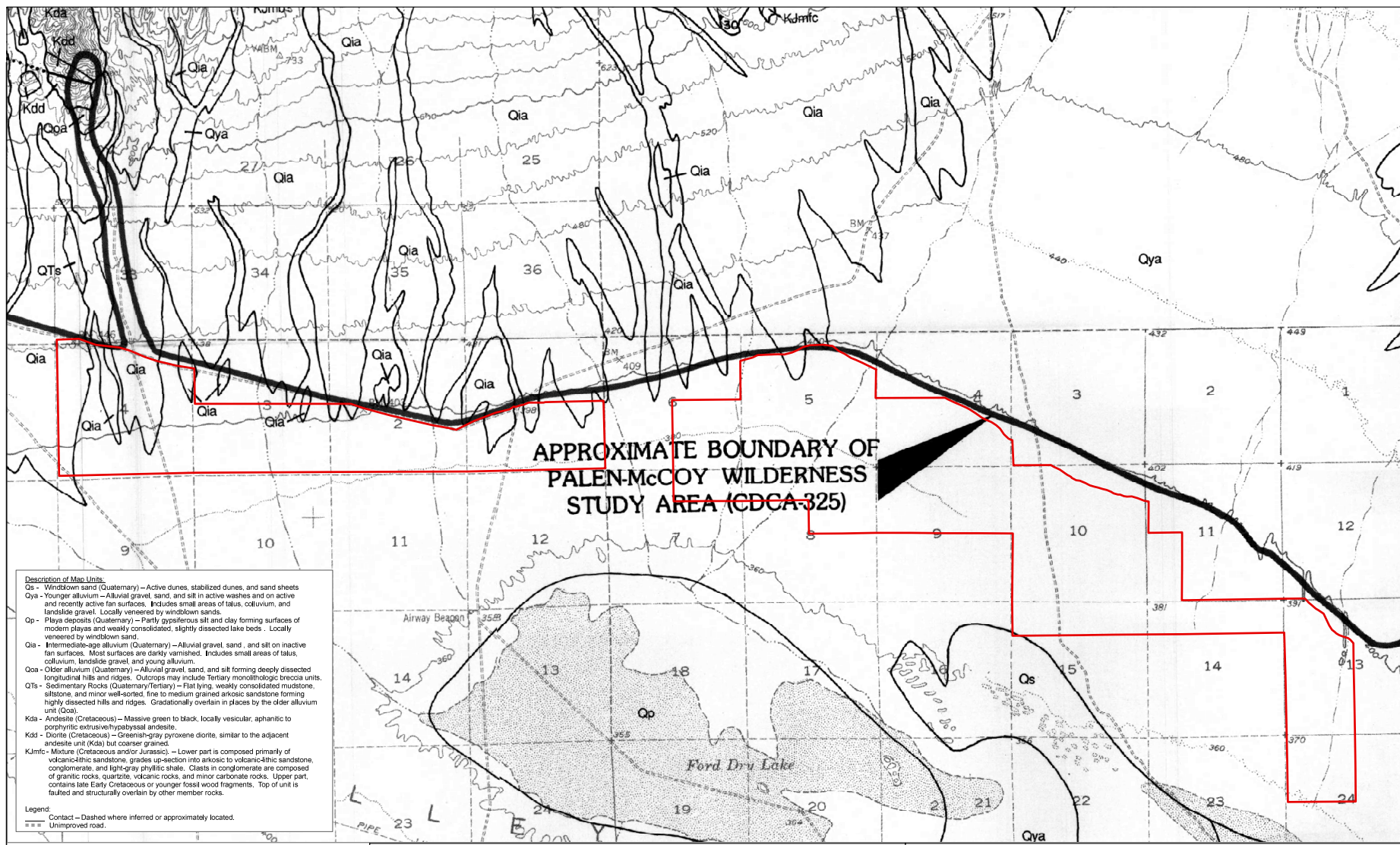
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BLYTHE ASOS ANNUAL WIND ROSE

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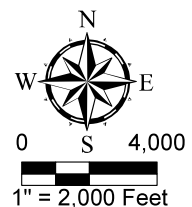
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5



"GEOLOGIC MAP OF THE PALEN-McCOY WILDERNESS STUDY AREA AND VICINITY, RIVERSIDE COUNTY, CALIFORNIA", Stone and Pelka, 1989
All locations approximate Scale is 1:24,000.

PROJECT SITE BOUNDARY



GENESIS SOLAR, LLC.



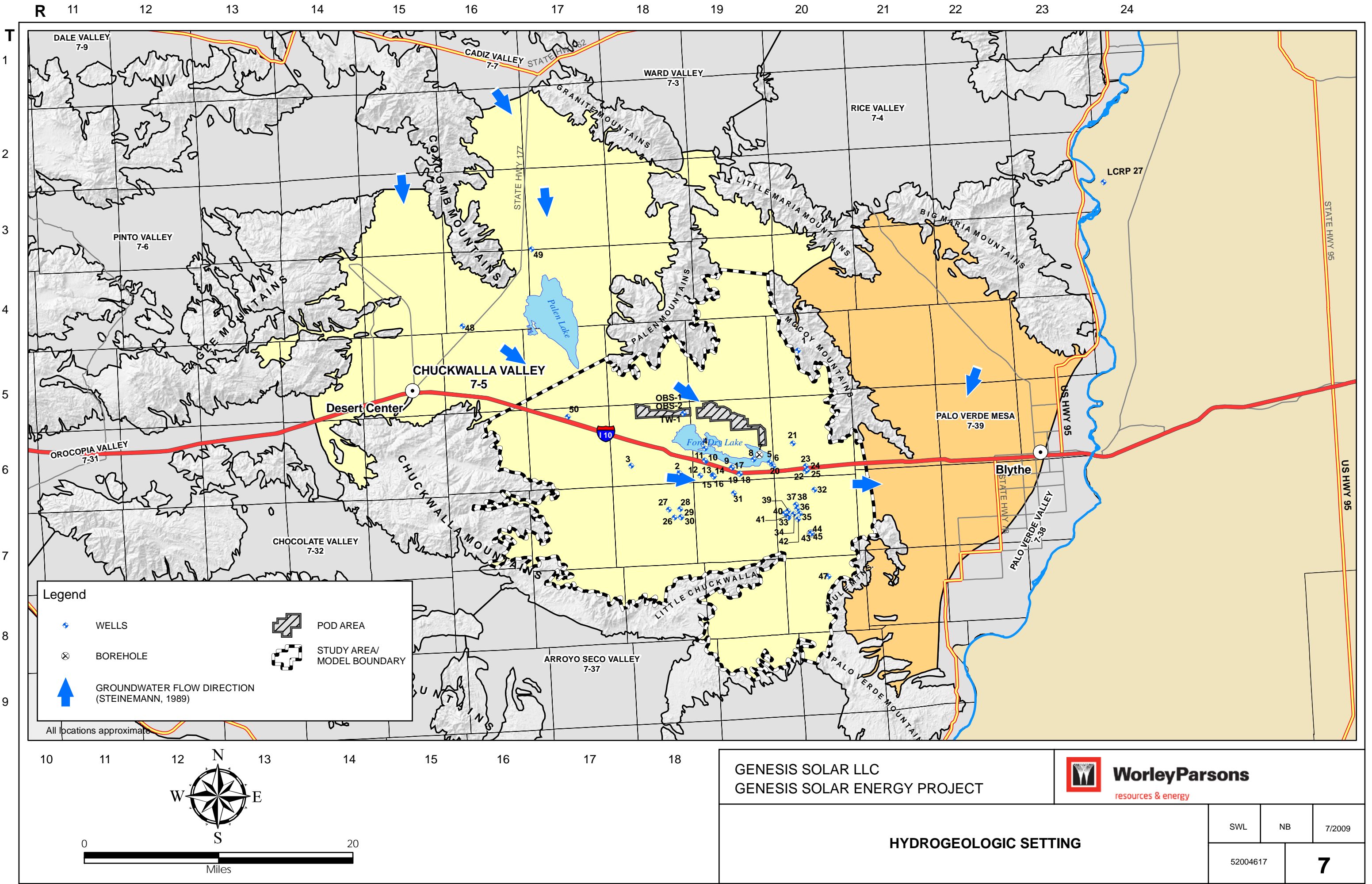
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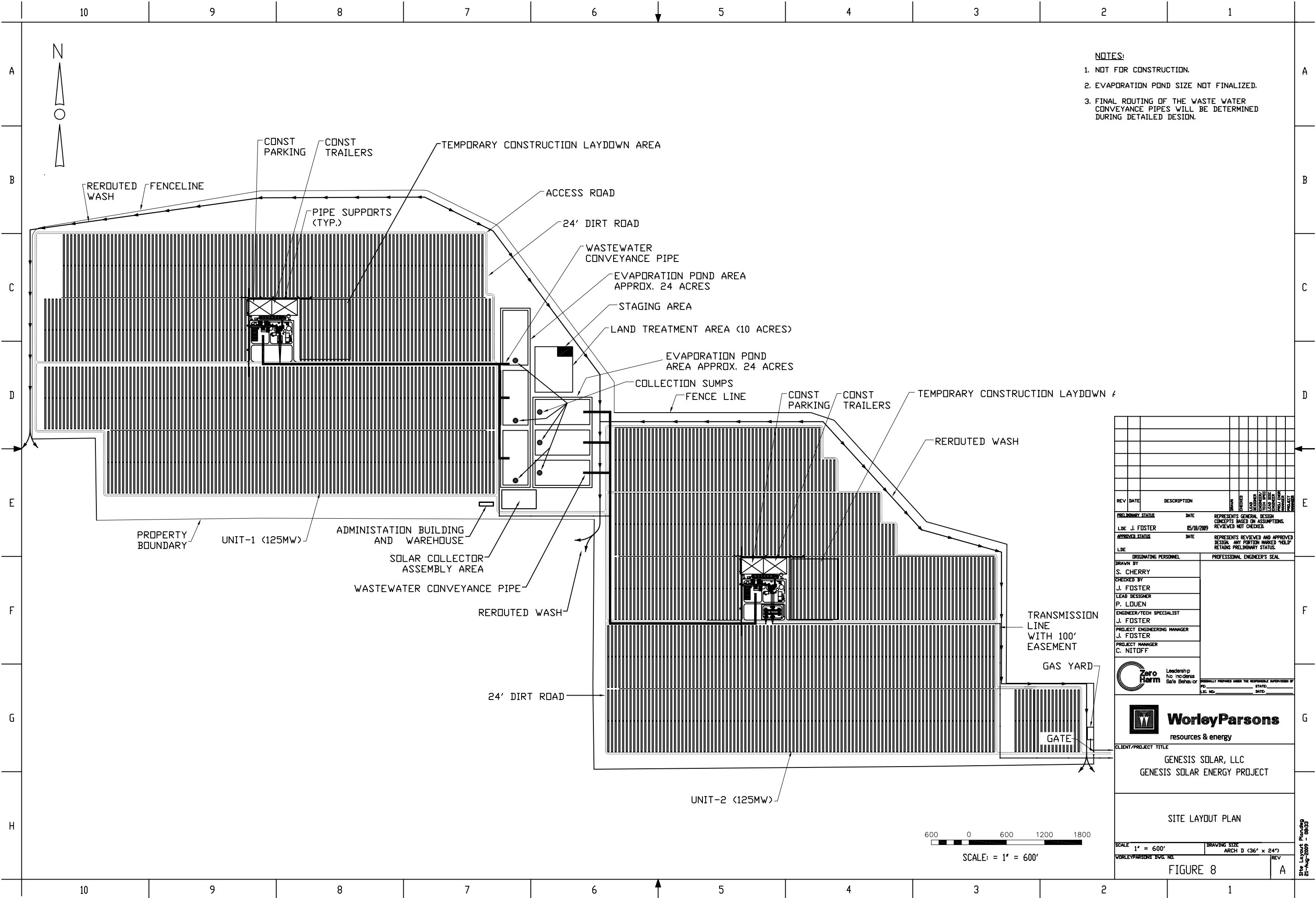
AREA GEOLOGIC MAP

SWL	MT	8/2009
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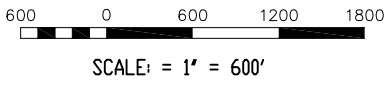
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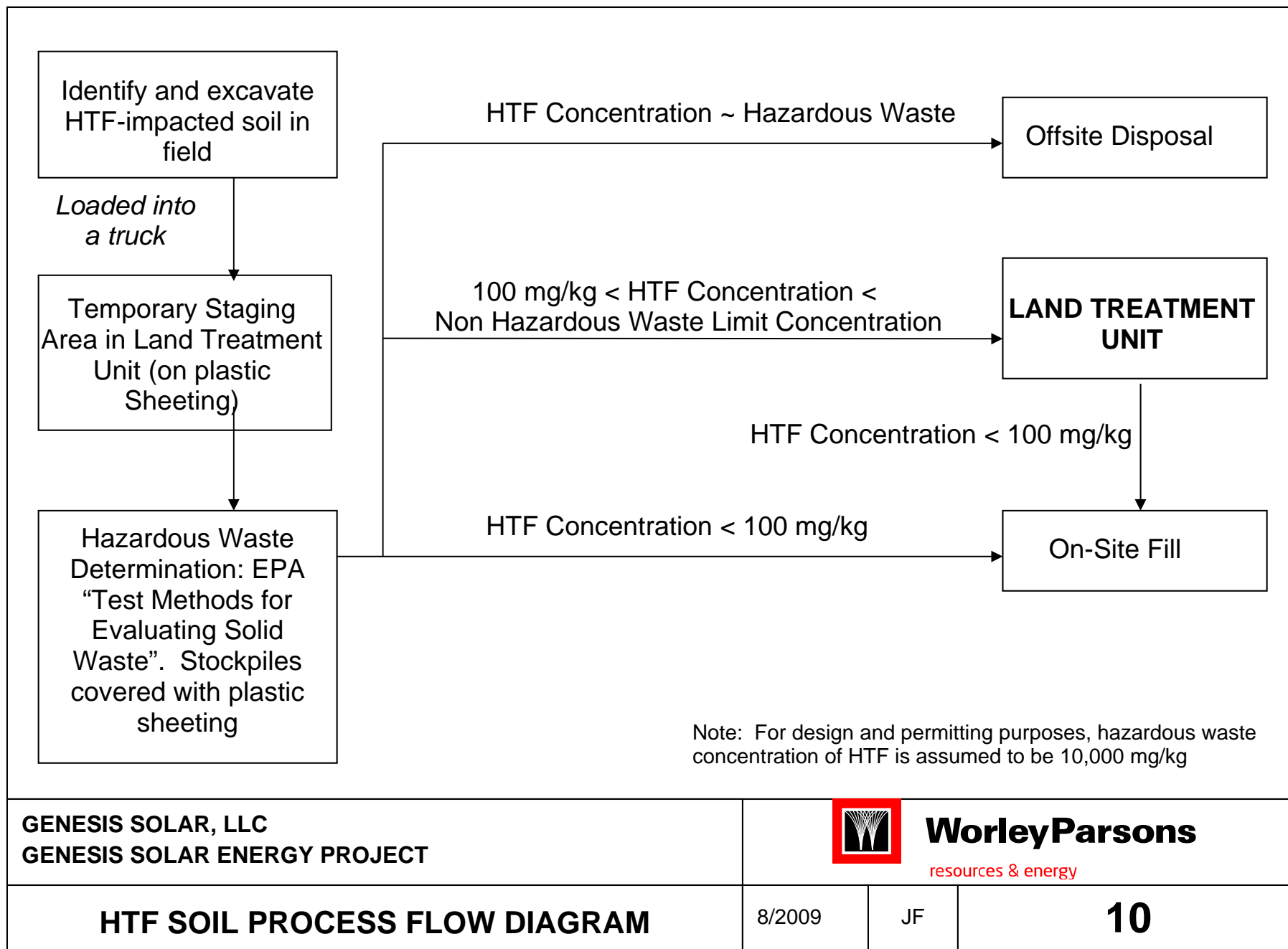
- NOTES:**
- 1. NOT FOR CONSTRUCTION.
 - 2. EVAPORATION POND SIZE NOT FINALIZED.
 - 3. FINAL ROUTING OF THE WASTE WATER CONVEYANCE PIPES WILL BE DETERMINED DURING DETAILED DESIGN.

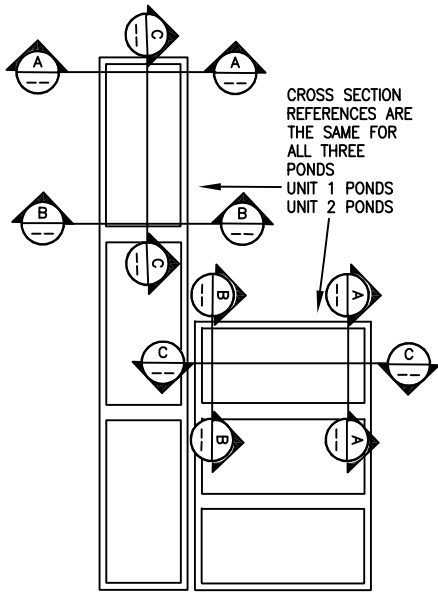
REV	DATE	DESCRIPTION	DRAWN	CHECKED	DESIGNED	ENGINEER	PROJECT
PRELIMINARY STATUS		DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.				
LDE J. FOSTER		05/18/2009					
APPROVAL STATUS		DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.				
LDE							
ORIGINATING PERSONNEL			PROFESSIONAL ENGINEER'S SEAL				
DRAWN BY							
S. CHERRY							
CHECKED BY							
J. FOSTER							
LEAD DESIGNER							
P. LOUEN							
ENGINEER/TECH SPECIALIST							
J. FOSTER							
PROJECT ENGINEERING MANAGER							
J. FOSTER							
PROJECT MANAGER							
C. NITOFF							
			Leadership No incidents Safe Behavior				
			PROFESSIONALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF				
			PE: _____ STATE: _____				
			LIC. NO.: _____ DATE: _____				
			resources & energy				
CLIENT/PROJECT TITLE							
GENESIS SOLAR, LLC							
GENESIS SOLAR ENERGY PROJECT							
SITE LAYOUT PLAN							
SCALE 1" = 600'			DRAWING SIZE ARCH D (36" x 24")		REV		
WORLEYPARSONS DIVISION					A		
FIGURE 8							



Site Layout Planning
5/18/2009 - 08/09

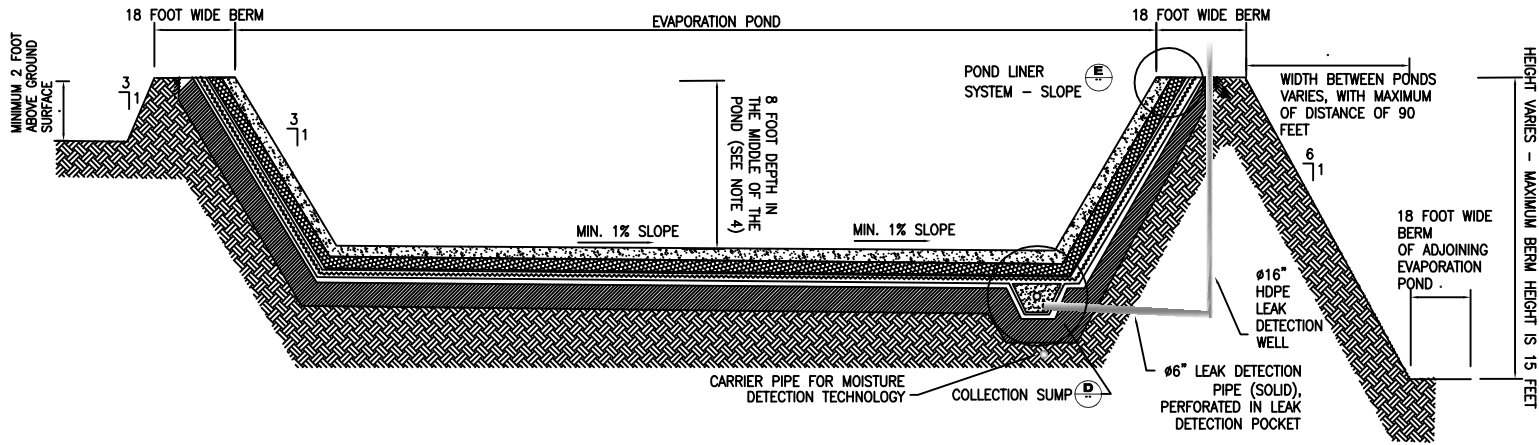




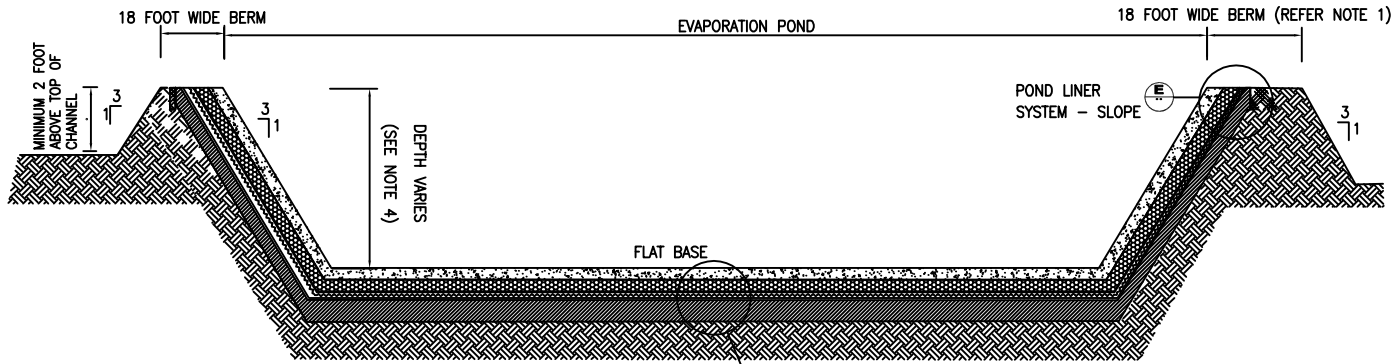


1 PLAN VIEW CONFIGURATION OF EVAPORATION PONDS
N.T.S. (PLAN VIEW MAY VARY)

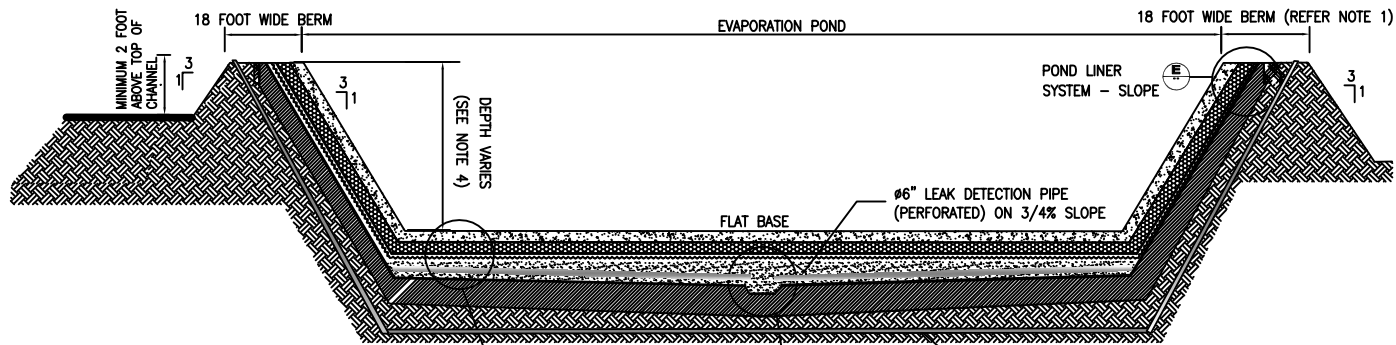
CROSS SECTION REFERENCES ARE THE SAME FOR ALL THREE PONDS
UNIT 1 PONDS
UNIT 2 PONDS



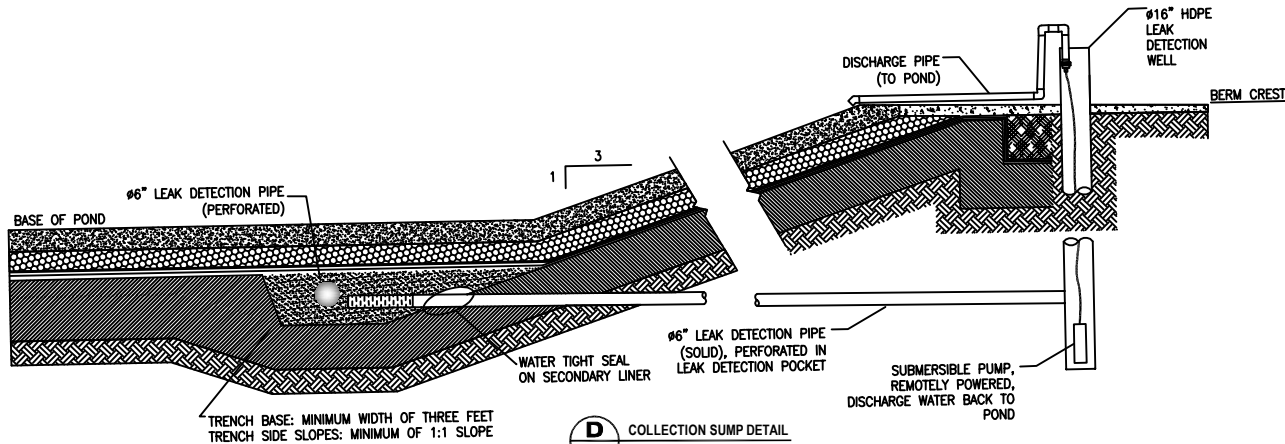
C CROSS SECTION THROUGH THE MIDDLE OF THE PONDS
N.T.S.



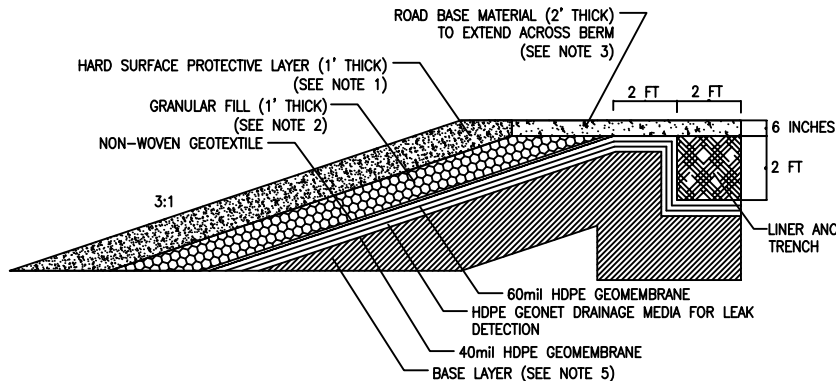
A UPSTREAM CROSS SECTION OF THE PONDS
N.T.S.



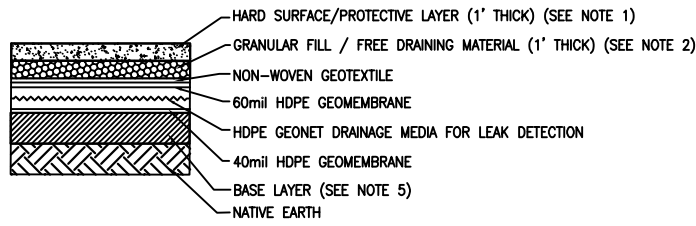
B DOWNSTREAM CROSS SECTION OF THE PONDS
N.T.S.



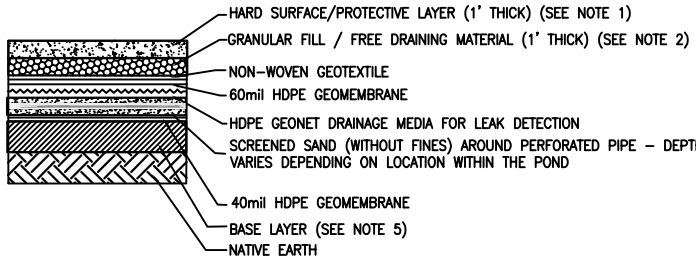
D COLLECTION SUMP DETAIL
N.T.S.



E POND LINER SYSTEM DETAIL - SLOPES
N.T.S.



F POND LINER SYSTEM DETAIL - FLOOR WITHOUT TRENCH
N.T.S.



G POND LINER SYSTEM DETAIL - FLOOR WITH TRENCH
N.T.S.

- NOTE:
1. HARD SURFACE / PROTECTION LAYER TO BE 1 FOOT OF ROLLER COMPACTED CONCRETE OR APPROVED EQUIVALENT.
 2. GRANULAR FILL / FREE DRAINING SUB BASE MUST HAVE MAXIMUM PARTICLE SIZE OF 1/2".
 3. BERM IS A MINIMUM OF 12 FEET WIDE AND MAXIMUM OF 18 FEET WIDE. BERM COVERED BY A MINIMUM 6 INCHES OF ROADBASE MATERIAL.
 4. AVERAGE POND DEPTH OF 8 FEET ALLOWS FOR 2 FEET OF FREEBOARD, 3 FEET OF OPERATIONAL DEPTH AND 3 FEET OF SLUDGE ACCUMULATION. MINIMUM 1% SLOPE ACROSS POND BASE, THEREFORE UPSTREAM END OF THE POND WILL HAVE A DEPTH OF LESS THAN 8 FEET AND THE DOWNSTREAM END OF THE POND WILL HAVE A DEPTH OF MORE THAN 8 FEET.
 5. BASE LAYER: PREFERRED MATERIAL IS 2 FOOT OF ON SITE MATERIAL WITH A HYDRAULIC CONDUCTIVITY OF LESS THAN 1 X 10-6 CM/S, OF WHICH AT LEAST 30% OF THE MATERIAL SHALL PASS THROUGH A NO.200 U.S. STANDARD SIEVE. IF THIS MATERIAL IS NOT AVAILABLE, THE ALTERNATIVE DESIGN IS A GEOSYNTHETIC CLAY LINER (GCL).
 6. SEE TEXT FOR FURTHER DETAILS.

PRELIMINARY STATUS	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE APPROVED STATUS	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL	
DRAWN BY	PRELIMINARY NOT FOR CONSTRUCTION	
CHECKED BY		
LEAD DESIGNER		
ENGINEER/TECH SPECIALIST		
PROJECT ENGINEERING MANAGER		
PROJECT MANAGER		

Zero Harm Leadership No Incidents Safe Behavior
ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE: _____ STATE: _____
LIC. NO.: _____ DATE: _____

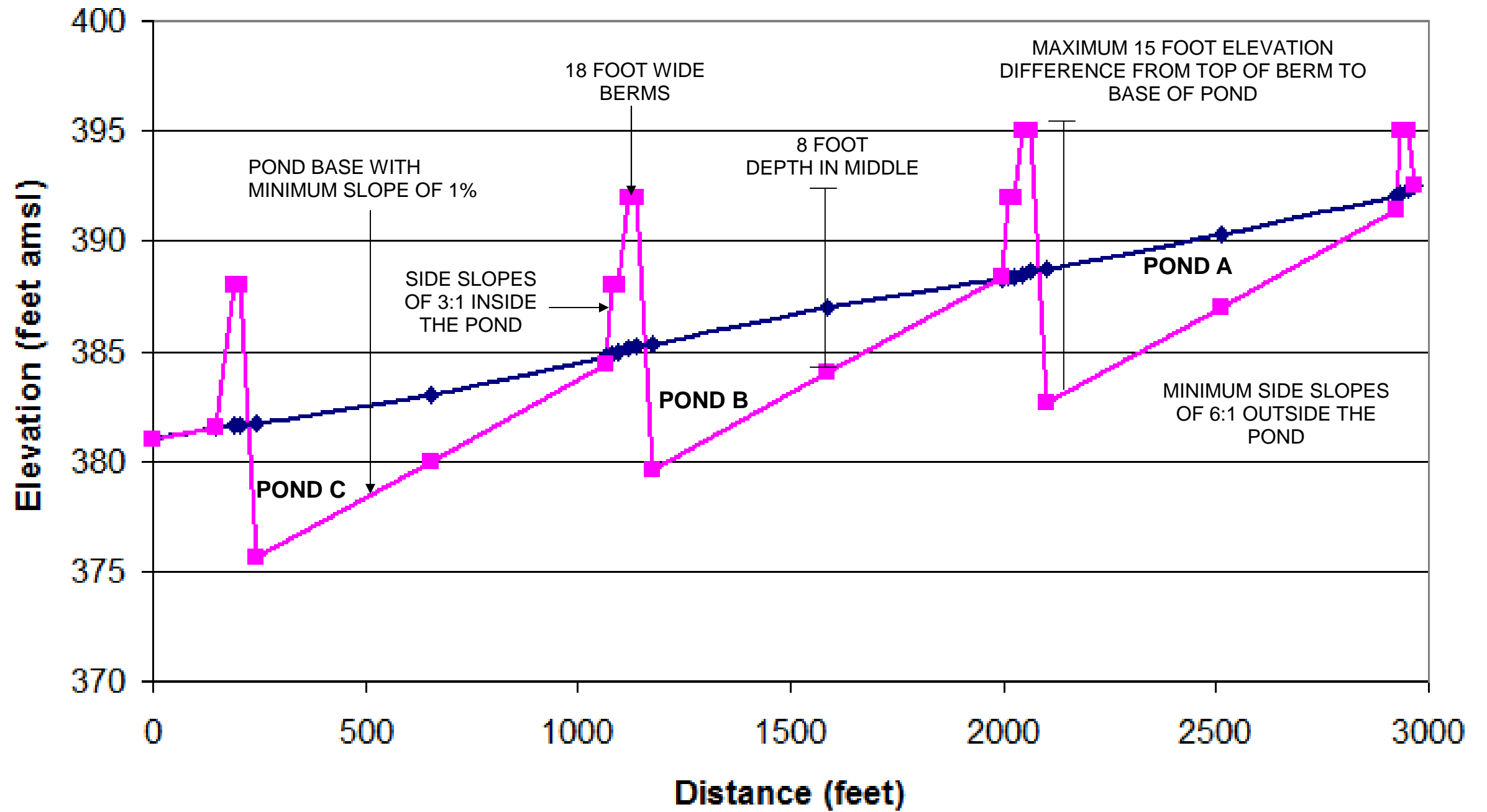
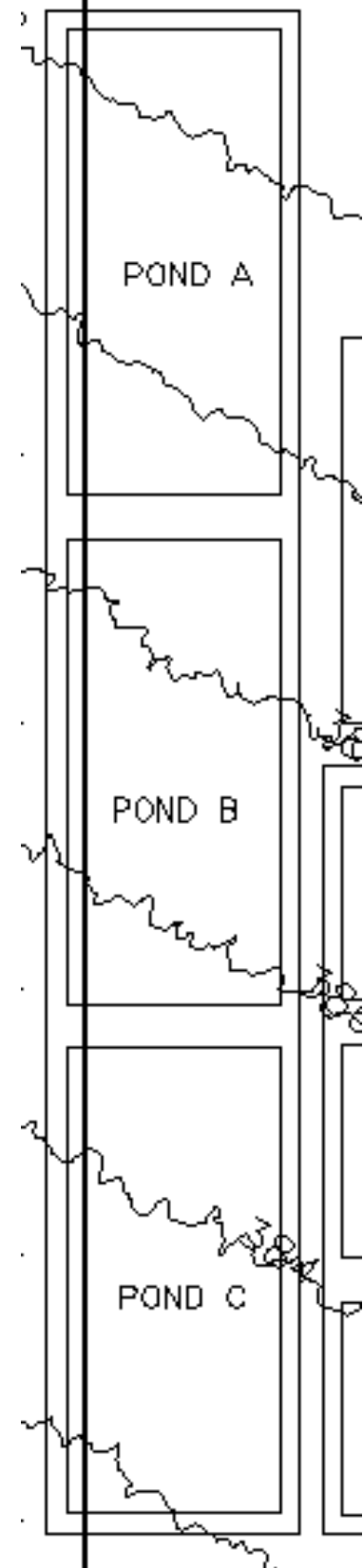
WorleyParsons
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CLIENT/PROJECT TITLE
GENESIS SOLAR, LLC
GENESIS SOLAR ENERGY PROJECT

EVAPORATION POND
SECTION AND DETAILS

SCALE: N.T.S. DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO. _____ REV
FIGURE 12 A

CROSS SECTION



- Existing Ground Surface
- Pond Surface

GENESIS SOLAR LLC
GENESIS SOLAR ENERGY PROJECT

**EVAPORATION POND AREA CROSS SECTION
— UNIT 1**



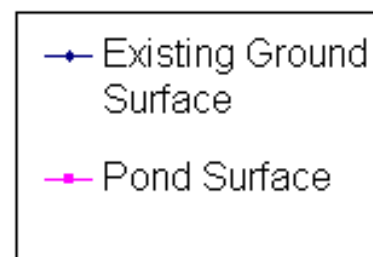
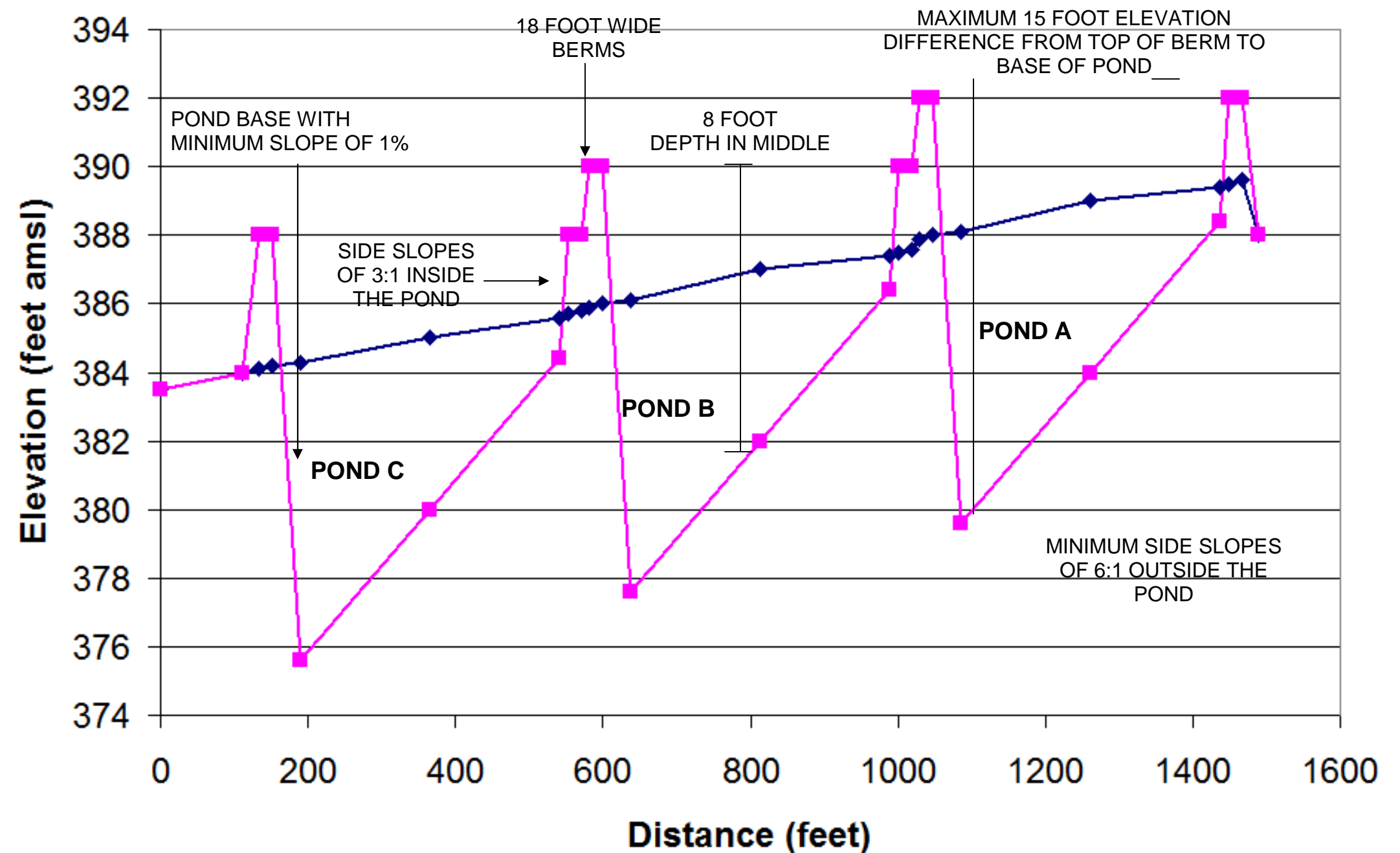
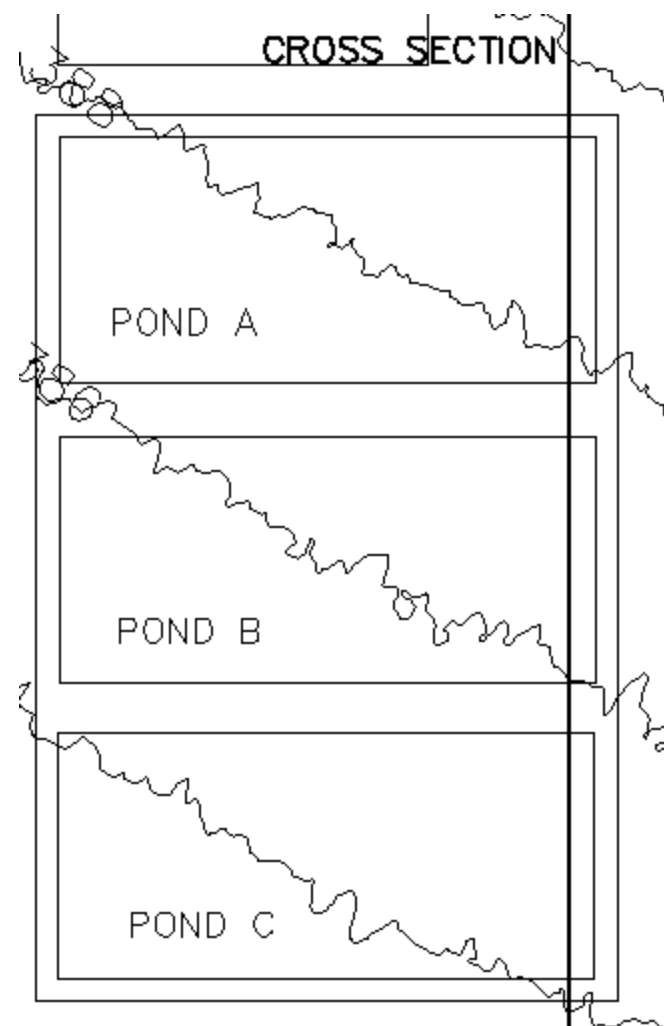
WorleyParsons


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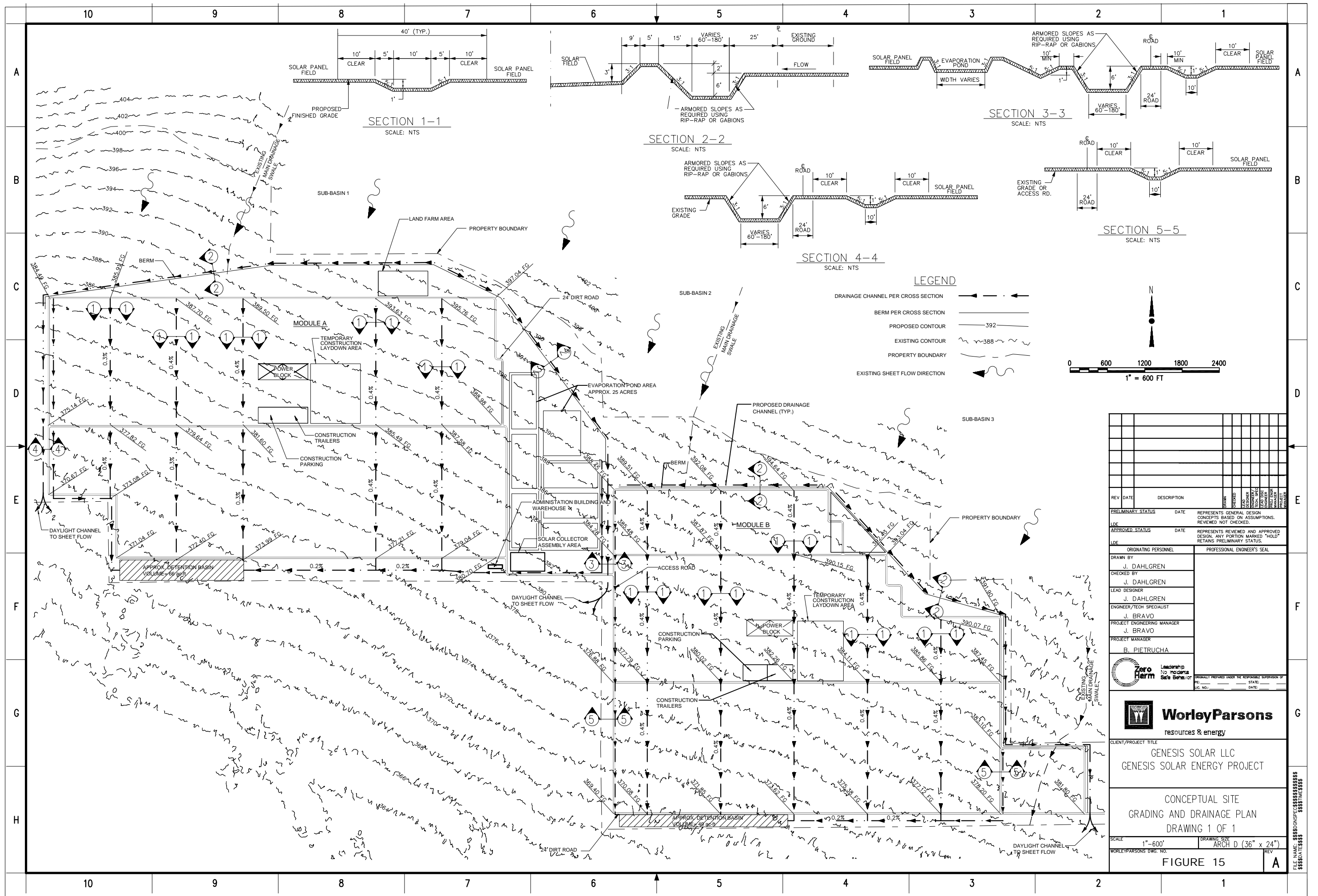
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13A



GENESIS SOLAR LLC GENESIS SOLAR ENERGY PROJECT		 WorleyParsons resources & energy		
EVAPORATION POND AREA CROSS SECTION — UNIT 2		08/2009	JF	13B



TABLES

DRAFT

Table 1
Site Climate Data
Genesis Solar Energy Project

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (°F)	66.7	72	78.5	86.4	95.2	104.6	108.4	106.6	101.3	89.8	75.9	66.6	87.7
Average Min. Temperature (°F)	41.5	45.4	50.2	56.5	64.4	72.7	81	80.2	73	60.9	48.6	41.2	59.7
Average Temperature (°F)	54.1	58.7	64.4	71.5	79.8	88.7	94.7	93.4	87.2	75.4	62.3	53.9	73.7
Average Max Dry Bulb (°F)	68.3	67.6	72.1	81.0	98.8	99.9	104.4	105.4	95.2	85.1	76.8	64.8	84.9
Average Min Dry Bulb (°F)	46.2	49.3	52.9	58.9	72.9	73.2	82.4	84.6	78.1	64.4	56.5	43.9	63.6
Average Dry Bulb (°F)	57.2	58.4	62.5	69.9	85.8	86.5	93.4	95.0	86.6	74.8	66.7	54.3	74.3
Average RH (morning)	57.0	56.0	52.0	47.0	44.0	41.0	49.0	55.0	57.0	54.0	56.0	58.0	52.2
Average RH (afternoon)	28.0	24.0	21.0	17.0	15.0	13.0	22.0	24.0	24.0	23.0	27.0	32.0	22.5
Average RH (total)	42.5	40.0	36.5	32.0	29.5	27.0	35.5	39.5	40.5	38.5	41.5	45.0	37.3
Average Windspeed (mph)	4.3	5.8	6.0	6.7	6.9	7.4	7.8	7.2	6.3	5.1	4.3	4.3	6.0

Source Data Location: Blythe CAA Airport for Average Temperatures (from <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca0927>) Data from 1948 to 2008
Ford Dry Lake, CA Typical Data Year (Dry Bulb Temperatures and Wind Speed)
Yuma, Az for Relative Humidity (from NOAA <http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/avgrh.html>) Data through 2002

Notes:

1. °F ~ Degrees Farenheit
2. RH ~ Relative Humidity
3. mph ~ miles per hour



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Table 2
Site Evaporation and Precipitation Data
Genesis Solar Energy Project

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Published Evaporation (in)	2.85	4.38	7.15	9.98	12.73	14.85	14.95	13.59	10.80	7.60	3.98	2.49	105.35
Lake Evaporation Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
%TDS in Ponds	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5
Salinity Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Monthly Precipitation (in)	0.47	0.43	0.36	0.16	0.02	0.02	0.24	0.63	0.36	0.26	0.20	0.40	3.55
Monthly Evaporation (in)	1.17	1.94	3.34	4.83	6.26	7.30	7.24	6.38	5.14	3.61	1.86	1.03	50.12

Source Data Location: Indio Fire Station, CA (Evaporation - Average 1927 - 2005) and Blythe CAA Airport (Precipitation - Average 1948 to 2008)
 Site evaporation data are based on Indio Fire Station, CA (approximately 70 miles west of Site but closest data point)
 pan evaporation rate data as found at <http://www.wrcc.dri.edu/htmlfiles/westevap.final.html#CALIFORNIA>
 Precipitation Data from <http://www.wrcc.dri.edu>

Notes:

1. Published Class "A" pan evaporation rates are used but must be converted to pond evaporation rates by the use of the following equation:

$$Evaporation = (PanEvaporationRate - Precipitation) * LakeFactor * SalinityFactor$$

2. Monthly Lake Evaporation Factor is 0.70.
3. Total Dissolved Solids (TDS) in Ponds is 34.5% (sea water) as the raw water will be brackish
4. in ~ inches



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Table 3
Sufficiently Active Faults within 100 Kilometers of the Site
Genesis Solar Energy Project

Fault Name	Approximate Distance and Direction from Site	Slip Rate (mm/year)	Maximum Earthquake Magnitude
San Andreas Fault	46 miles (74 km) southwest	>5	7.4
Brawley Seismic Zone	47 miles (76 km) miles southwest	1 to >5	7.2
Pinto Mountain Fault	54 miles (86 km) west-northwest	1 to 5	7
Pisgah- Bullion Fault	57 miles (91 km) northwest	0.2 to 1	7.1
Imperial Fault	61 miles (98 km) southwest	>5	7
San Jacinto-Anza Fault	61 (98 km) miles southwest	1 to >5	7.2

Notes:

Fault locations and slip rates taken from USGS Earthquake Hazard Program Quaternary Fault and Fold Database (<http://gldims.cr.usgs.gov/qfault/viewer.htm>), using lat 33.67, long 115.00 as the Site coordinates. Maximum Magnitude taken from California Department of Conservation, Division of Mines and Geology, 1998. Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada.

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Table 4
Raw Water Chemistry
Genesis Solar Energy Project

Species	Concentration from onsite test well		Concentration Used in Water Balance
	Measured 350-550 ft bgs	Measured 800 ft bgs	
Antimony	ND	ND	ND
Arsenic	0.0240	0.0092	0.0092
Barium	0.300	0.033	0.033
Beryllium	ND	ND	ND
Cadmium	ND	ND	ND
Calcium	160	66	66
Chloride	5,600	2,300	2,300
Chromium	ND	ND	ND
Cobalt	ND	ND	ND
Copper	ND	ND	ND
Dissolved Silica	--	15	15
Fluoride	4.6	1.1	1.1
Iron	1.4	0	0
Lead	ND	ND	ND
Magnesium	38	14	14
Manganese	0.065	0.029	0.029
Mercury	ND	ND	ND
Molybdenum	0.44	0.24	0.24
Nickel	ND	ND	ND
Nitrate	ND	0.5	0.5
Nitrite	ND	ND	ND
Potassium	30	12	12
Selenium	ND	ND	ND
Silver	ND	ND	ND
Sodium	4,500	1,500	1,500
Sulfate	1,500	810	810
Thallium	ND	ND	ND
Vanadium	ND	ND	ND
Zinc	ND	ND	ND
TDS	9,500	5,000	5,000
Total Alkalinity (as CaCO ₃)	97	150	150
Total Hardness (as CaCO ₃)	570	220	220
pH	7.9	7.8	7.8
Specific Cond (uS/cm @ 25C)	19,000	8,800	8,800

Notes:

ND = Not Detected

.- - Not sampled/analysed



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Table 5
Predicted Chemistry of Wastewater Streams
Genesis Solar Energy Project

Stream Title	Makeup Water (as mg/L)	Cooling Tower Blowdown	3 Streams that feed into the Evaporation Ponds			Combined Discharge to Evaporation Pond	STLC (mg/L)	TCLP (mg/L)
			Pre-Treatment MMF Backwash	Post-Treatment MMF Backwash	Post-Treatment 2nd Stage RO Reject			
Arsenic	0.009	0.006	0.009	0.030	0.114	0.089	5.0	5.0
Barium	0.03	0.02	0.03	0.11	0.41	0.32	100	100
Calcium	66	42	66	213	818	641	*	*
Chloride	2,300	1,449	2,300	7,408	28,496	22,349	*	*
Dissolved Silica	15	9	15	48	186	146	*	*
Fluoride	1.1	0.7	1.1	3.5	13.6	10.7	180	*
Iron	0.46	0.29	0.46	1.48	5.70	4.47	*	*
Magnesium	14	9	14	45	173	136	*	*
Manganese	0.03	0.02	0.03	0.09	0.36	0.28	*	*
Molybdenum	0.2	0.15	0.24	0.77	2.97	2.33	350	*
Nitrate	0.50	0.31	0.50	1.61	6.19	4.86	*	*
Potassium	12	8	12	39	149	117	*	*
Sodium	1,500	945	1,500	4,831	18,585	14,575	*	*
Sulfate	810	510	810	2,609	10,036	7,871	*	*
TDS	5,000	3,150	5,000	16,105	61,948	48,584	*	*
Total Alkalinity (as CaCO ₃)	150	94	150	483	1,858	1,458	*	*
Total Hardness (as CaCO ₃)	220	139	220	709	2,726	2,138	*	*
pH	7.80	8.20					*	*
Specific Cond (uS/cm @ 25C)	8,800	5,543	8,800	28,345	109,029	85,508	*	*

Notes:

Regulatory Standards/Reportable Quantities are for elements mentioned only

* Not listed/no standards

STLC = Soluble Threshold Limit Concentration, Regulated by CCR Title 22, Division 4.5, Article 3, Section 66261.24

TCLP = Toxicity Characteristics Leaching Procedure; Regulated under 40 CFR Section 261.24



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Table 6
Chemical Additives in Treatment Process
Genesis Solar Energy Project

Process	Aim	Type of Additive	Example of Additive
Circulating Water	Limit growth of bacteria	Oxidizing Biocide	Sodium Hypochlorite
	Limit formation of scale	pH Control	Sulfuric Acid, Hydrochloric Acid (included in Tables 5 and 7)
		Antiscalants	Organic Phosphates (used in small amounts)
	Minimize corrosion	Corrosion Inhibitors	Zinc, Phosphate (used in small amounts)
Pre- and Post- Treatment MMF and RO Units	Anti-Scalantant	Reverse Osmosis Anti-Scalant	Nalco PermaTreat_PC_191
	Coagulant and Flocculant	Multi-media Filter	Nalco NALCLEAR_7768

Table 7
Predicted Chemisty of Evaporation Pond Residue
Genesis Solar Energy Project

Constituent	Concentration in EP Discharge (mg/L)	Conversion to lbs/gal	Solids per year (lbs)	Total Residue Mass After 7 Years (lbs)	Total Residue Mass After 30 Years (lbs)	Weight (%)	Weight (ppm)	STLC** (mg/L)	TTLC Wet- Weight (mg/kg)	TCLP (mg/L)
CATIONS										
Calcium	641	0.005352	187,770	1,314,388	5,633,090	1.3985%	13,985	*	*	*
Magnesium	136	0.001135	39,830	278,810	1,194,898	0.2966%	2,966	*	*	*
Potassium	117	0.000973	34,140	238,980	1,024,198	0.2543%	2,543	*	*	*
Sodium	14,575	0.121630	4,267,492	29,872,447	128,024,773	31.7839%	317,839	*	*	*
ANIONS										
Chloride	22,349	0.186499	6,543,488	45,804,419	196,304,651	48.7353%	487,353	*	*	*
Fluoride	10.7	0.000089	3,129	21,906	93,885	0.0233%	233	180	18,000	*
Nitrate	4.86	0.000041	1,422	9,957	42,675	0.0106%	106	*	*	*
Silica (Dissolved)	146	0.001216	42,675	298,724	1,280,248	0.3178%	3,178	*	*	*
Sulfate	7,871	0.065680	2,304,446	16,131,121	69,133,377	17.1633%	171,633	*	*	*
METALS										
Antimony	0	0.000000	0	0	0	0.0000%	0	15	500	*
Arsenic	0.089	0.000001	26	157	785	0.0002%	2	5	500	5
Barium	0.32	0.000003	94	563	2,817	0.0007%	7	100	10,000	100
Beryllium	0	0.000000	0	0	0	0.0000%	0	1	75	*
Cadmium	0	0.000000	0	0	0	0.0000%	0	1	100	1
Chromium	0	0.000000	0	0	0	0.0000%	0	*	*	5
Cobalt	0	0.000000	0	0	0	0.0000%	0	5	2,500	*
Copper	0	0.000000	0	0	0	0.0000%	0	*	*	*
Iron	4.47	0.000037	1,309	7,852	39,261	0.0097%	97	*	*	*
Lead	0	0.000000	0	0	0	0.0000%	0	5	1,000	5
Manganese	0.28	0.000002	83	495	2,475	0.0006%	6	*	*	*
Mercury	0	0.000000	0	0	0	0.0000%	0	0	20	0.2
Molybdenum	2.33	0.000019	683	4,097	20,484	0.0051%	51	350	3,500	*
Nickel	0	0.000000	0	0	0	0.0000%	0	20	2,000	*
Selenium	0	0.000000	0	0	0	0.0000%	0	1	100	1
Silver	0	0.000000	0	0	0	0.0000%	0	5	500	5
Thallium	0	0.000000	0	0	0	0.0000%	0	7	700	*
Vanadium	0	0.000000	0	0	0	0.0000%	0	24	2,400	*
Zinc	0	0.000000	0	0	0	0.0000%	0	250	5,000	*
TOTAL	45,857		13,426,587	93,983,917	402,797,617	100.00%	1,000,000			
TDS	48,584	0.405432	14,224,975	99,574,823	426,749,242					

Conversion Factors	
8.34 lb H2O to 1 gallon of H2O	8.345
Average Wastewater Flow Rate (gal/min)	182
Operation time (min/year)	192,780
Wastewater Quantity (gal/year)	35,085,960

- Notes:**
Regulatory Standards/Reportable Quantities are for elements mentioned only
* Not listed/no standards
** The residue must be less than 10 times the STLC limit, otherwise a wet extraction test is required
- 1) Constitents in the Evaporation Pond Discharge is based on the raw water constituents

There may be other constituents in the residue however they are not listed as they have not been tested for

If the parameter was not detected in the groundwater, then it is considered to have zero residue in the sludge

3) All waste is non-volatile and will be collected in the evaporation ponds.

4) All species removed by MMF and RO are returned to the evap ponds

5) A comparison to TDS values is provided to show the consistency of the calculation



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Table 8
Colorado River Basin RWQCB Water Quality Standards
Genesis Solar Energy Project

OBJECTIVE	GOAL	RELEVANCE TO PROJECT
GENERAL OBJECTIVES		
General	Wherever the existing quality of water is better than the quality established herein as objectives, such existing quality shall be maintained unless otherwise provided for by the provisions of the State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California"	Existing water quality is protected by the evaporation ponds design with double liner and leak detection system
GENERAL GROUND WATER OBJECTIVES		
General	The Regional Board believes that detailed investigation of the ground water basins should be conducted before establishing specific ground water quality objectives. Until the Regional Board can complete investigations for the establishment of management practices, the objective will be to maintain the existing water quality where feasible.	Four quarterly monitoring events will be undertaken in the compliance wells to establish the background conditions for this site
Tastes and Odors	Ground waters for use as domestic or municipal supply shall not contain taste or odor-producing substances in concentrations that adversely affect beneficial uses as a result of human activity.	Not Applicable: Groundwater under the Site has a TDS > 3,000 mg/l therefore not considered for domestic or municipal supply
Bacteriological Quality	In ground waters designated for use as domestic or municipal supply (MUN), the concentration of coliform organisms shall not exceed the limits specified in California Code of Regulations, Title 22, Chapter 15, Article 3.	Not Applicable: Groundwater under the Site has a TDS > 3,000 mg/l therefore not considered for domestic or municipal supply
Chemical and Physical Quality	Ground waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the limits specified in California Code of Regulations, Title 22, Chapter 15, Article 4, Section 64435, Tables 2, 3, and 4 as a result of human activity.	Not Applicable: Groundwater under the Site has a TDS > 3,000 mg/l therefore not considered for domestic or municipal supply

OBJECTIVE	GOAL	RELEVANCE TO PROJECT
Brines	Discharges of water softener regeneration brines, other mineralized wastes, and toxic wastes to disposal facilities which ultimately discharge in areas where such wastes can percolate to ground waters usable for domestic and municipal purposes are prohibited.	Prohibition Applicable: Will be address through proper containment and LDGS design.
Radioactivity	Ground waters designated for use as domestic or municipal supply (MUN) shall not contain radioactive material in excess of the limits specified in California Code of Regulations, Title 22, Chapter 15, Article 5, Sections 64441 and 64443. The limits contained in Section 64443 are included under item "II.M Radioactivity"	Not Applicable: Radioactivity wastes will not be produced in this Project
Groundwater Overdraft	A number of ground water basins in the Region are in overdraft, and in some areas there have been indications of possible increase of mineral content of the ground water.	Not Applicable: Groundwater Basin is not in overdraft

Source Data Location: California RWQCB (2006), Water Quality Control Plan, Colorado River Basin Region 7, June 2006



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Table 9
Evaporation Pond Wastewater Start Up and Annual Sampling Parameters
Genesis Solar Energy Project

Parameter	Unit
Ammonia	As N
Aluminum	mg/l
Arsenic	mg/l
Boron	mg/l
Calcium	mg/l
Chloride	mg/l
Cyanide	mg/l
Fluoride	mg/l
Iron	mg/l
Magnesium	mg/l
Molybdenum	mg/l
Nitrate as nitrogen	mg/l
Nitrite as nitrogen	mg/l
Phosphate	mg/l
Potassium	mg/l
Selenium	mg/l
Silica	mg/l
Silicon	mg/l
Sodium	mg/l
Strontium	mg/l
Sulfate	mg/l
Total dissolved solids	mg/l
Total alkalinity	mg/l as CaCO ₃
Zinc	mg/l
Biphenyl	mg/l
Diphenyl	mg/l
pH	pH



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Table 10

**Evaporation Pond Wastewater Semi-Annual Sampling Parameters
Genesis Solar Energy Project**

Parameter	Unit
Chloride	mg/l
Chlorine	mg/l
Selenium	mg/l
Sulfate	mg/l
Total dissolved solids	mg/l
Temperature	Fahrenheit or Celsius
pH	pH

Note: Semi Annual Samples to be a composite sample of all three ponds



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Table 11
Evaporation Pond Residue Sampling Parameters
Genesis Solar Energy Project

Parameter	Unit
Title 22 metals (total)	mg/kg
Biphenyl, diphenyl oxide	mg/kg



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Table 12
Land Treatment Unit Wastewater Sampling Parameters
Genesis Solar Energy Project

Parameter	Unit
Biphenyl	mg/l
Diphenyl	mg/l



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Table 13
Land Treatment Unit Soil Sampling Parameters
Genesis Solar Energy Project

Parameter	Unit
Biphenyl Oxide	mg/l
Diphenyl Oxide	mg/l

APPENDICES

DRAFT

APPENDIX A: HEAT TRANSFER FLUID INFORMATION



DEPARTMENT OF TOXIC SUBSTANCES CONTROL

400 P Street, 4th Floor
P O Box 808
Sacramento, CA 95812-0808
(916) 327-2500

April 4, 1995

Mr. David M. Rib, Manager of Regulatory Affairs
KJC Operating Company
41100 Highway 395
Boron, CA 93516

Re: REQUEST FOR RECLASSIFICATION OF THERMINOL CONTAMINATED SOIL AS
NONHAZARDOUS PURSUANT TO SECTION 66260.200(f), TITLE 22, CALIFORNIA CODE OF
REGULATIONS (22 CCR) - WASTE EVALUATION UNIT FILE #F143 (WEU FILE #F143)

Dear Mr. Rib:

The Office of Scientific Affairs, Department of Toxic Substances Control (Department) has completed its review of the information submitted to the Department by you on behalf of the KJC Operating Company. The information was submitted in support of a petition to reclassify soil contaminated with a heat transfer fluid (HTF) known as Therminol as nonhazardous pursuant to 22 CCR section 66260.200(f). Based on our review of all the analytical data and information submitted, the Department finds that the Therminol-contaminated soil possesses mitigating physical and chemical characteristics which render it insignificant as a hazard to human health and safety, livestock, and wildlife. The Department, therefore, classifies the Therminol-contaminated soil as nonhazardous.

Background

The KJC Operating Company (KJC) facility, located in Boron, California, encompasses approximately 160 acres where a series of parabolic mirror troughs called Solar Collecting Assemblies (SCAs) are configured into multiple rows to form a solar field. The HTF, a synthetic material whose composition is a mixture of 26.5% biphenyl and 73.5% diphenyl oxide, is circulated through heat collection elements positioned at the focal point of each of the SCAs. The HTF is heated to between 650 and 735 degrees fahrenheit and, through a series of heat exchangers, generates steam for power production.

Occasional accidental or incidental spills or leaks of HTF result in contamination of the soils beneath the point of leakage. When these occur, the HTF-contaminated soils are excavated and transported to a central storage area. Historically, these HTF-contaminated soils were typically disposed of off-site into a Class I waste landfill. However, alternative treatment technologies have been explored for the management of this waste, the most recent being an on-site bioremediation facility. An estimated 500 cubic yards of HTF-contaminated sandy soil is generated per year. The average concentration of HTF in these contaminated soils ranges between 3,000 and 10,000 ppm.

ATTACHMENT "B"

Mr. David Rib
April 4, 1995
Page 3

Department's position that the test results demonstrate that the mitigating property is the much lower vapor pressure at the maximum ambient temperature, which will result in greatly reduced inhalation exposure than the theoretical value. Therefore, the Department grants your request for reclassification of the spilled Therminol as nonhazardous based on the information you previously submitted.

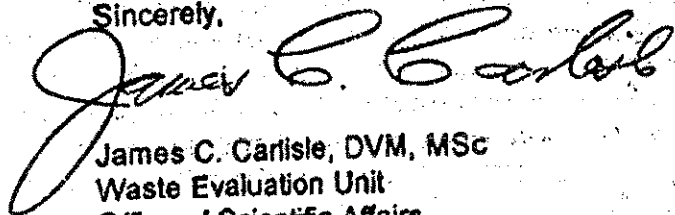
Conclusion

Based on the review of the analytical data and information provided, the Department finds that the HTF contaminated soils poses an insignificant hazard and classifies the waste as nonhazardous pursuant to 22 CCR section 66260.200(f). The Department's formal decision as outlined in this letter is contingent on the accuracy and representativeness of the analytical data and information provided to the Department for review. Furthermore, the nonhazardous classification granted in this letter is not to be construed as an approval by the Department to leave the HTF-contaminated soil on the site or for any other uses. Waste classification determines whether a waste must be managed and disposed of as a hazardous waste in accordance with Chapter 6.5, Division 20, of the California Health and Safety Code.

Irrespective of the Department's classification decision outlined in this letter, the management and disposal of the HTF-contaminated soils are subject to the requirements of the respective Regional Water Quality Control Board and other state, federal, or local agencies who have regulatory jurisdiction in this matter. It is the Department's understanding that the California Energy Commission, Energy Facilities Siting and Environmental Protection Division will also be providing direct oversight to insure that the HTF-contaminated soils will be managed and disposed of properly.

Should you have any questions regarding this classification letter, you may contact me at the letterhead address and telephone number. Classification of heat transfer fluid, ref: your letter of February 14, 1995.

Sincerely,



James C. Carlisle, DVM, MSc
Waste Evaluation Unit
Office of Scientific Affairs

cc: Jeffrey J. Wong, PhD
Science Advisor to the Director

Sharon Fair
Surveillance and Enforcement, Region 4

Ronald Pillorin
Waste Evaluation Unit
Office of Scientific Affairs

Solutia Inc.

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: THERMINOL® VP1 Heat transfer fluid

Reference Number: 000000000211

Date: 05/16/2006

Company Information:

United States:

Solutia Inc.
575 Maryville Center Drive, P.O. Box 66760
St. Louis, MO 63166-6760
Emergency telephone: Chemtrec: 1-800-424-9300
International Emergency telephone: Chemtrec: 703-527-3887
Non-Emergency telephone: 1-314-674-6661

Canada:

Solutia Canada Inc.
6800 St. Patrick Street
LaSalle, PQ H8N 2H3
Emergency telephone: CANUTEC: 1-613-996-6666
Non-Emergency telephone: 1-314-674-6661

Mexico:

Solutia MEXICO, S. DE R.L. DE C.V.
Prol. Paseo de la Reforma 2654
Local 501, Piso-5
Col. Lomas Altas
11950 Mexico, D.F.
Emergency telephone: SETIQ: (in Mexico) 01-800-002-1400
Non-Emergency telephone: (in Mexico) 01-55-5259-6800

Brazil:

Solutia Brazil Ltd.
Avenue Carlos Marcondes, 1200
CEP: 12241-420-São José dos Campos/SP-Brazil
Emergency telephone: 55 12 3932 7100 (PABX)
Non-Emergency telephone: 55 11 3365 1800 (PABX)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Form:	liquid
Colour:	clear to colourless
Odour:	characteristic

WARNING STATEMENTS

WARNING!
Causes eye irritation
Causes skin irritation
Causes respiratory tract irritation
Contains material which can cause liver and nerve damage

POTENTIAL HEALTH EFFECTS

Likely routes of exposure: eye and skin contact
inhalation

Eye contact: Highly irritating to eyes.

Skin contact: Highly irritating to skin.
Prolonged or repeated skin contact may result in irritant dermatitis.

Inhalation: Severely irritating if inhaled.
No more than slightly toxic if inhaled.
Significant adverse health effects are not expected to develop under normal conditions of exposure.

Ingestion: No more than slightly toxic if swallowed.
Significant adverse health effects are not expected to develop if only small amounts (less than a mouthful) are swallowed.

Signs and symptoms of overexposure: headache
fatigue
nausea/vomiting
indigestion
abdominal pain
tremors

Target organs/systems: May cause liver damage
May cause nerve damage

Refer to Section 11 for toxicological information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<u>Components</u>	<u>CAS No.</u>	<u>Average concentration</u>	<u>Concentration range</u>	<u>Units</u>
diphenyl ether	101-84-8	73.5		%
biphenyl	92-52-4	26.5		%

4. FIRST AID MEASURES

If in eyes: Immediately flush with plenty of water for at least 15 minutes.
If easy to do, remove any contact lenses.
Get medical attention.
Remove material from skin and clothing.

If on skin: Immediately flush the area with plenty of water.
Remove contaminated clothing.
Wash skin gently with soap as soon as it is available.
Get medical attention.
Wash clothing before reuse.

If inhaled: Remove patient to fresh air.
If not breathing, give artificial respiration.
If breathing is difficult give oxygen.
Remove material from eyes, skin and clothing.

If swallowed: Immediate first aid is not likely to be required.
A physician or Poison Control Center can be contacted for advice.
Wash heavily contaminated clothing before reuse.

5. FIRE FIGHTING MEASURES

Fire point: 127 C

Hazardous products of combustion: carbon monoxide (CO); carbon dioxide; hydrocarbons

Extinguishing media: Water spray, foam, dry chemical, or carbon dioxide

Unusual fire and explosion hazards: None known

Fire fighting equipment: Firefighters, and others exposed, wear self-contained breathing apparatus.
Equipment should be thoroughly decontaminated after use.

Miscellaneous advice: This product is not classified as a fire-resistant heat transfer fluid.
Precautions to avoid sources of ignitions should be taken.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Use personal protection recommended in section 8.

Environmental precautions: Keep out of drains and water courses.

Methods for cleaning up: Contain large spills with dikes and transfer the material to appropriate containers for reclamation or disposal. Absorb remaining material or small spills with an inert material and then place in a chemical waste container. Flush spill area with water.

Refer to Section 13 for disposal information and Sections 14 and 15 for reportable quantity information.

7. HANDLING AND STORAGE

Handling

Avoid contact with eyes, skin and clothing.

Avoid breathing vapour or mist.

Keep container closed.

Use with adequate ventilation.

Wash thoroughly after handling.

Precautions against ignitions and fire should be taken with this product.

Heat transfer fluids are intended for INDIRECT heating purposes ONLY.

This product has not been approved for food grade use.

Emptied containers retain vapour and product residue. Observe all recommended safety precautions until container is cleaned, reconditioned or destroyed. Do not cut, drill, grind or weld on or near this container. The reuse of this material's container for non industrial purposes is prohibited and any reuse must be in consideration of the data provided in this material safety data sheet.

Storage

General: Stable under normal conditions of handling and storage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne exposure limits: (ml/m³ = ppm)

THERMINOL® VP1 No specific occupational exposure limit has been established.

biphenyl
ACGIH TLV: 0.2 ml/m³ ; mist ; 8-hr TWA
OSHA PEL: 0.2 ml/m³ ; 1.0 mg/m³ ; ; 8-hr TWA
Mexican OEL: 0.2 ml/m³ ; 1.5 mg/m³ ; ; 8-hr TWA
Mexican OEL: 0.6 ml/m³ ; 4 mg/m³ ; ; 15-min STEL

diphenyl ether
ACGIH TLV: 1 ml/m³ ; ; 8-hr TWA
ACGIH TLV: 2 ml/m³ ; ; 15-min STEL
OSHA PEL: 1 ml/m³ ; 7 mg/m³ ; ; 8-hr TWA
Mexican OEL: 1 ml/m³ ; 7 mg/m³ ; ; 8-hr TWA
Mexican OEL: 2 ml/m³ ; 14 mg/m³ ; ; 15-min STEL

Eye protection: Wear safety goggles.
Have eye flushing equipment available.

Hand protection: Wear chemical resistant gloves.
Consult the glove/clothing manufacturer to determine the appropriate type
glove/clothing for a given application.
See Solutia Glove Facts for permeation data.

Body protection: Wear suitable protective clothing.
Consult the glove/clothing manufacturer to determine the appropriate type
glove/clothing for a given application.
Wear full protective clothing if exposed to splashes.
Wash contaminated skin promptly.
Launder contaminated clothing and clean protective equipment before reuse.
Wash thoroughly after handling.
Have safety shower available at locations where skin contact can occur.

Respiratory protection: Avoid breathing vapour or mist.
Use approved respiratory protection equipment (full facepiece recommended) when
airborne exposure limits are exceeded.
If used, full facepiece replaces the need for face shield and/or chemical goggles.
Consult the respirator manufacturer to determine the appropriate type of equipment for
a given application.
Observe respirator use limitations specified by the manufacturer.

Ventilation: Provide natural or mechanical ventilation to control exposure levels below airborne
exposure limits.
If practical, use local mechanical exhaust ventilation at sources of air contamination
such as processing equipment.

Components referred to herein may be regulated by specific Canadian provincial legislation. Please refer to exposure
limits legislated for the province in which the substance will be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

Flash point:	110 C	Pensky-Martens closed tester
	124 C	Cleveland Open Cup

Autoignition temperature:	612 C	ASTM D-2155
Density:	1.06 g/cm ³ @ 25 C	
Boiling point :	257 C	
Crystallising point :	12 C	
Water solubility:	~25 mg/l	

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

Conditions to avoid:	All sources of ignition.
Materials to avoid:	Contact with strong oxidizing agents.
Hazardous reactions:	Hazardous polymerization does not occur.
Hazardous decomposition products:	None known;

11. TOXICOLOGICAL INFORMATION

This product has been tested for toxicity. Results from Solutia sponsored studies or from the available public literature are described below.

Acute animal toxicity data

Oral:	LD50 , rat, 2,050 mg/kg , No more than slightly toxic
Dermal:	LD50 , rabbit, > 5,010 mg/kg , Practically nontoxic after skin application in animal studies.
Inhalation:	LC50 , rat, 2.66 mg/l , 4 h, Toxic based on animal inhalation exposure studies.
Skin irritation:	rabbit , Slightly irritating to skin., 24 h
Repeat dose toxicity:	rat, , inhalation, 13 weeks, , Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies.
Repeat dose toxicity:	rat, , gavage, 26 weeks, , Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies. Effects only observed at very high dose levels.
Target organs affected	kidneys, liver, spleen
Repeat dose toxicity:	rat, , diet, subchronic, , Repeated oral exposure produced liver and kidney changes in animal models.
Target organs affected	liver, kidneys
Developmental toxicity:	rat, gavage, , No effects on offspring observed in laboratory animals in the presence of maternal toxicity.

Mutagenicity: No genetic effects were observed in standard tests using bacterial and animal cells.

Components

Data from Solutia studies and/or the available scientific literature on the components of this material which have been identified as hazardous chemicals under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200) or the Canadian Hazardous Products Act are discussed below.

biphenyl	Chronic exposure has been reported to cause headache, fatigue, nausea, indigestion, abdominal pain, tremor, central and peripheral nerve damage and liver injury. Slightly toxic following oral administration. Practically nontoxic after skin application in animal studies. Practically non irritating to skin (rabbit). Slightly irritating to eyes (rabbit). No mortality or signs of toxicity at the highest level achievable. Irritating to respiratory system in animal models. Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies. Produced no dermal sensitization (guinea pigs). No effects on offspring observed in laboratory animals in the presence of maternal toxicity. No genetic effects were observed in standard tests using bacterial and animal cells.
diphenyl ether	Predictive patch testing on human volunteers did not produce irritation or sensitization. Slightly toxic following oral administration. Practically nontoxic after skin application in animal studies. Slightly irritating to eyes (rabbit). Slightly irritating to skin (rabbit). Repeated exposure produced respiratory tract irritation in animal models. Repeated exposure produced eye irritation in animal models. No genetic effects were observed in standard tests using bacterial and animal cells.

12. ECOLOGICAL INFORMATION

Environmental Toxicity

Invertebrates	48 h, EC50	Water flea (<i>Daphnia magna</i>)	2.4 mg/l
Fish:	96 h, LC50	Rainbow trout (<i>Oncorhynchus mykiss</i>)	7.6 mg/l
	96 h, LC50	Fathead minnow (<i>Pimephales promelas</i>)	24 mg/l
Algae:	96 h, EC50	Algae (<i>Selenastrum capricornutum</i>)	1.3 mg/l
Biodegradation	Modified SCAS (OECD 302A) Primary degradation 99 %		

13. DISPOSAL CONSIDERATIONS

US EPA RCRA Status: This material when discarded may be a hazardous waste as that term is defined by the Resource Conservation and Recovery Act (RCRA), 40 CFR 261.24, due to its toxicity characteristic. This material should be analyzed in accordance with Method 1311 for the compound(s) below.

US EPA RCRA D018 Compound/Characteristic: BENZENE

hazardous waste number:

Disposal considerations: Incineration

Miscellaneous advice: This product meets the criteria for a synthetic used oil under the U.S. EPA Standards for the Management of Used Oil (40 CFR 279). Those standards govern recycling and disposal in lieu of 40 CFR 260 -272 of the Federal hazardous waste program in states that have adopted these used oil regulations. Consult your attorney or appropriate regulatory official to be sure these standards have been adopted in your state. Recycle or burn in accordance with the applicable standards.
Solutia operates a used fluid return program for certain fluids under these used oil standards. Contact your Sales Representative for details.
This product should not be dumped, spilled, rinsed or washed into sewers or public waterways.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

US DOT

Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
biphenyl
Hazard Class: 9
Hazard Identification number: UN3082
Packing Group: Packing Group III
Transport label: Class 9
Special provisions: This material meets the definition of a marine pollutant.
Other: Applies ONLY to containers with an RQ or for shipments in bulk via water transportation.

Canadian TDG

Other: Not regulated for transport.

Reportable Quantity/Limit

US DOT RQ 100 lb *biphenyl*
Package size containing reportable amount: 377 lb

ICAO/IATA Class

Other: See DOT Information

15. REGULATORY INFORMATION

All components are in compliance with the following inventories: U.S. TSCA, EU EINECS, Canadian DSL, Australian AICS, Korean, Japanese ENCS, Phillipine PICCS, Chinese

Canadian WHMIS classification: D2(A) - Materials Causing Other Toxic Effects
D2(B) - Materials Causing Other Toxic Effects

SARA Hazard Notification:

Hazard Categories Under Title III Rules (40 CFR 370): Immediate
Delayed

Section 302 Extremely Hazardous Substances: Not applicable

Section 313 Toxic Chemical(s): biphenyl

CERCLA Reportable Quantity:

100 lbs biphenyl

For this/these chemicals, release of more than the Reportable Quantity to the environment in a 24 hour period requires notification to the National Response Center (800-424-8802 or 202-426-2675).

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation and the MSDS contains all the information required by the Canadian Controlled Products Regulation.

Refer to Section 11 for OSHA/HPA Hazardous Chemical(s) and Section 13 for RCRA classification.

Safety data sheet also created in accordance with Brazilian law NBR 14725

16. OTHER INFORMATION

Product use: Heat transferring agents

Reason for revision: Significant changes to the following section(s):, Section 1

	Health	Fire	Reactivity	Additional Information
Suggested NFPA Rating	2	1	0	
Suggested HMIS Rating:	2	1	0	G

Prepared by the Solutia Hazard Communication Group. Please consult Solutia @ 314-674-6661 if further information is needed.

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APPENDIX B: ACTION LEAKAGE RATES

**WorleyParsons**

resources & energy

CLIENT: Genesis Solar, LLC
PROJECT : Genesis Solar Energy Project

JOB NUMBER:

ALR Calculation 1

SUBJECT: Action Leakage Rate

CALCULATION No.:

REV.:	0	1	2	3
BY/DATE:	JF / 06-08-09			
REV/DATE:				
LDE/DATE:				

The maximum flow rate from a single hole in the primary HDPE liner that a geocomposite drainage layer can convey without the fluid head on the secondary liner exceeding one foot is given by the following equation (USEPA 1992)

$$Q = k \cdot D \cdot (2h - D) \quad (\text{Equation 1})$$

Where:

Q = flow rate through a single hole in the primary liner (ft³/s) per acre

k = hydraulic conductivity of the leakage detection layer (geonet) ft/s

h = head on the secondary liner (ft)

D = thickness of the leak detection layer (geonet) (ft)

k = transmissivity / thickness

Transmissivity (of geonet) = 0.0003 m²/s (3×10⁻⁴m²/s or more is requirement under Federal Regs - actual value will be dependant on material used during construction)

Thickness (of geonet) = 5 mm (assumed - to be revised after construction)
0.005 m

k = 0.0003 / .005
0.06 m/s

Conversion: 1 meter = 3.28 feet
0.1968 ft/s

D = 5 mm
0.0164 ft

h = 1 ft allowed 1 foot under EPA guidelines

Q = 0.1968 x 0.0164 x (2*1-0.0164)
0.0064 ft³/s per acre
553 ft³/day per acre

Conversion: 1 cubic foot = 7.480 gallon [US, liquid]

Q = 4138 gal/acre/day

Applying a Safety Factor of 50%:

Q = 2758 gal/acre/day

RECOMMENDED ALR = 2,750 gal/acre/day

These calculations would need to be revised based on the actual drainage material used on site during construction. The material used is critical to the hydraulic conductivity and therefore the final ALR value. If sand/gravel was used instead of the geonet, the ALR would be lower as its hydraulic conductivity would be less

**WorleyParsons**

resources & energy

CLIENT: Genesis Solar, LLC
PROJECT: Genesis Solar Energy Project

JOB NUMBER:

ALR Calculation 2

SUBJECT: Action Leakage Rate

CALCULATION No.:

REV.:	0	1	2	3
BY/DATE:	JF / 06-08-09			
REV/DATE:				
LDE/DATE:				

Cross Check the ALR Calculation 1 against another method of estimating the ALR.

For leakage calculations in secondary standard lining systems, Giroud and Bonapart concluded that for geomembranes installed with good CQA/CQC, a defect frequency of one hole per acre is appropriate.

"J.P. Giroud and R. Bonaparte, "Leakage Through Liners Constructed with Geomembranes, Part 1: Geomembrane Liners", *Geotextiles and Geomembranes*, Vol.8, No.1 pp27-67 1989

They also recommend that a large size of 1 cm² (11.3 mm diameter) be used for calculations to size LDS and that a small hole size of 3.1 mm² (2-mm diameter) be used to evaluate the performance of the lining system (ALR rate).

Bernoulli's equation through an orifice

where:

$$Q = C_b a (2gh)^{0.5} \quad \text{(Equation 2)}$$

Q = Leakage Rate

C_b = dimensionless coefficient - 0.6 for sharp edges

a = area of single defect (m²)

g = acceleration due to gravity (m/s)

h = liquid depth over geomembrane (m)

Liquid depth on liner	3 ft	0.91	metre	("operational" liquid level)
Potential depth on liner	8 ft	2.43	metre	(worst case with freeboard and sludge)

Large Hole 1 per acre

D = 0.0113 m

A = 1.E-04 m²

Q = 0.6 x 1.E-04 x (2 x 9.81 x 2.43)^{1/2}

. = 4.15E-04 m³/acre/s

Conversion: 1 cubic meter = 264.172 gallon [US, liquid]

Q = 1.10E-01 gal/acre/s

. = 9477 gal/acre/day

Performance Hole 1 per acre

D = 0.002 m

A = 3.14E-06 m²

Q = 0.6 x 3.1E-06 x (2 x 9.81 x 2.43)^{1/2}

. = 1.30E-05 m³/acre/s

Q = 3.44E-03 gal/acre/s

. = 297 gal/acre/day

The standard ALR through a large hole in the primary liner is 9500 gal/acre/day (assign as Rapid Leakage Rate)

The ALR through a small hole in the primary liner is 300 gal/acre/day

Based on the EPA requirements, a small hole in the primary liner would not cause the ALR to be exceeded.

Reference:

Evaporation Pond Lining System Equivalency Analysis

Idaho National engineering and Environmental Laboratory 07/24/2001

APPENDIX C: DETECTION MONITORING PROGRAM

GENESIS SOLAR ENERGY PROJECT

DETECTION MONITORING PROGRAM

Submitted to:

California Regional Water Quality Control Board
Colorado River Basin Region

Submitted by:

Genesis Solar, LLC

With technical assistance from:

WorleyParsons Group, Inc.

August 2009

DETECTION MONITORING PROGRAM
GENESIS SOLAR ENERGY PROJECT

Prepared By:

Janine Forrest

Date

Reviewed By:

Mike Tietze, California Registered Geologist and Certified Hydrogeologist, as an employee of WorleyParsons, with expertise in groundwater hydrology, has reviewed the report with the title "Detection Monitoring Program". His signature and stamp appear below.

Mike Tietze, PG, CHG, CEG

Date

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APPENDIX A: STANDARD OPERATING PROCEDURES

1. INTRODUCTION

This report presents a Detection Monitoring Program (DMP) for the proposed Genesis Solar Energy Project ("Project"), located in the Colorado Desert between the communities of Blythe, CA (approximately 24 miles east) and Desert Center, CA (approximately 27 miles west).

Genesis Solar, LLC, is proposing to construct, own and operate the Project on an approximate 1,800-acre site near Ford Dry Lake in Riverside County, California (refer **Figure 1**). The Project is a concentrated solar power (CSP) electric generating facility that will use a proven parabolic trough solar thermal technology. The troughs will concentrate the sun's heat on tubes carrying a petroleum-based Heat Transfer Fluid (HTF) that will be used for steam production. The steam in turn will be used to power a steam turbine generator.

Genesis Solar LLC proposes to use three evaporation ponds and a land treatment unit (LTU) per 125MW unit as part of the Project. The evaporation ponds will receive, store and evaporate wastewater from operations at the Project site. The LTU will receive, temporarily store and treat soil that has been impacted by occasional leaks and spills of HTF.

This DMP is specific to the evaporation ponds and LTU associated with the Project. Due to the proximity of the evaporation ponds to the LTU, it is proposed to have one DMP for both waste management units.

1.1 PURPOSE

This DMP is intended to be a stand alone separable document to the application for Report of Waste Discharge (RoWD) / Joint Technical Document (JTD) for the Project, in accordance with the *California Integrated Waste Management Board (CIWMB) Title 27 Regulations, Division 2, Subdivision 1*, requirements for a corrective action program (refer **Section 1.2**).

The RoWD/JTD contains supplementary information such as evaporation ponds and LTU design, construction standards, sampling, inspection and maintenance plans, contingency plan and corrective action program.

1.2 REGULATORY REQUIREMENTS

There are references to DMP's in the following sections of *California Code of Regulations (CCR), Title 27 Environmental Protection, Division 2 Solid Waste, Subdivision 1*:

- *Chapter 3, Subchapter 3, Article 1, Section 20385* – Required Programs: Lists 'Detection Monitoring Program" which Genesis Solar LLC requires to undertake detection monitoring unless the evaluation monitoring or corrective action program is enacted. Where necessary, concurrent detection monitoring with the aforementioned programs may take place.

- *Chapter 3, Subchapter 3, Article 1, Section 20415* – General Water Quality Monitoring and System Requirements:
 - For Groundwater: Outlines monitoring point requirements to yield groundwater samples from the uppermost aquifer, zone of saturation and zone of perched water;
 - For Surface Water: Outlines monitoring point requirements to yield samples from each surface water body that represents the quality of surface water that has not been affected by a release;
 - For Unsaturated Zone Monitoring: Outlines monitoring point requirements to yield soil pore liquid samples or soil pore liquid measurements that provide the best assurance of the earliest possible detection of a release.
- *Chapter 3, Subchapter 3, Article 1, Section 20420* – Detection Monitoring Program: Outlines the requirements for the Detection Monitoring Program
- *Chapter 3, Subchapter 3, Article 1, Section 20435* – Unsaturated Zone Monitoring and Response Provisions for Land Treatment Units: Outlines the requirements for conducting unsaturated zone monitoring at LTU's.

1.3 OBJECTIVES

The objective of the DMP is to determine if a release has occurred from the evaporation ponds and LTU, and if groundwater quality is being degraded.

1.4 REGIONAL GEOLOGY

The project area is underlain by Holocene to Miocene basin fill deposits. These deposits include younger alluvium, older (Pleistocene) alluvium, the Pliocene Bouse Formation and the Miocene fanglomerate. The uppermost alluvium in the basin consists of Holocene to Pleistocene alluvial fan, fluvial, playa, and aeolian (wind blown) deposits.

The older alluvium (Pleistocene age) consists of fine to coarse sand interbedded with gravel, silt, and clay (DWR 1963). The Pleistocene alluvium likely comprises the most important aquifer in the area (DWR 1963).

The Pliocene-age Bouse Formation is a marine to brackish-water sequence that is composed of a basal limestone overlain by interbedded clay, silt, sand, and tufa (Metzger 1968). Near the southeastern portion of the basin the Bouse Formation occurs at a depth between approximately 100 to 800 feet below ground surface (Wilson and Owens-Joyce 1994).

The fanglomerate lies unconformably below the Bouse Formation and is composed chiefly of angular to subrounded and poorly sorted partially to fully cemented pebbles with a sandy matrix (Metzger 1973). The fanglomerate is likely Miocene age; however, it may in part be Pliocene age

(Metzer 1973). Near the southeastern portion of the basin the fanglomerate occurs at a depth between approximately 800 to 5,000 feet below ground surface (Wilson and Owens-Joyce 1994).

Geologic units near the project area consist of the recent dune sand, recent alluvium, and non-marine sedimentary deposits. The unconsolidated alluvial fan, river channel, and stream deposits consist of silt, sand, clay, and gravel. These also include recent floodplain deposits of the Colorado River including silt, sand, and clay. The nonmarine sedimentary deposits consist of older alluvium and fanglomerate, dissected with well-developed desert pavement and desert varnish in some areas. These consist mostly of clay, siltstone, sand, and gravel.

The project site lies within the eastern part of Riverside County in a part of California considered not to be seismically active. Although there are numerous faults off-site in the mountainous parts of the Chuckwalla Valley, most do not exhibit recent activity and have been presumed to be Tertiary or pre-Tertiary in age (Stone, 2006). The faults considered most likely to produce large earthquakes include the San Andreas, Imperial, and San Jacinto-Anza faults. The San Andreas and San Jacinto-Anza faults are situated approximately 41 and 46 miles west of the site. The Imperial fault is located approximately 65 miles south of the site.

The site is not located within a State of California Earthquake Fault Zone designated by the Alquist-Priolo Special Studies Zone Act of 1972 (formerly known as a Special Studies Zone), an area where the potential for fault rupture is considered probable.

The area around the Project site is within a zone of potential liquefaction due to the alluvial (e.g., gravels, clays, silts, and sands) nature of the soil. Liquefaction is a phenomenon in which saturated, cohesionless soils temporarily lose their strength and liquefy when subjected to dynamic forces such as intense and prolonged ground shaking.

1.5 REGIONAL HYDROGEOLOGY

The site is located in the eastern half of the Chuckwalla Valley Groundwater Basin (refer **Figure 3**) which encompasses approximately 605,000 acres. The basin generally trends east-southeast and is bounded by consolidated rocks of the Chuckwalla, Little Chuckwalla, and Mule Mountains on the south, of the Eagle Mountains on the west, and of the Mule and McCoy Mountains on the east. Groundwater flow is directed southward from the basin's boundary with the Cadiz Valley Basin and east-southeastward from its boundary with the Pinto Valley Basin, toward the eastern basin boundary where it flows into the adjacent Palo Verde Mesa Basin.

There are three water-bearing sedimentary units overlying non-water bearing bedrock in the Chuckwalla Valley Groundwater Basin; *Quaternary Alluvium*, *Pliocene Bouse Formation* and *Miocene Fanglomerate* (DWR, 2004; DWR, 1963). DWR reports the maximum thickness of these deposits as about 1,200 feet in the Chuckwalla Valley Basin (DWR 1979). Gravity studies performed by USGS near the narrows between the McCoy and Mule Mountains on the southeastern portion of the basin suggests the depth to non-water bearing bedrock ranges from approximately 6,500 feet bgs to 1,000 feet bgs (Wilson and Owens-Joyce 1994).

Groundwater quality varies markedly in the basin. The higher quality groundwater is located in the western portion of the basin near Desert Center and the lower quality water is located in the southeastern portion of the basin near Ford Dry Lake (Steinemann, 1989). Groundwater to the south and west of Palen Lake is typically sodium chloride to sodium sulfate-chloride in character (DWR 2004). The detected concentrations of total dissolved solids (TDS) in the basin ranges from 274 milligrams per liter (mg/L) to 8,150 mg/L with an average concentration of 2,100 mg/L (Steinemann 1989). Generally, the dissolved-solids concentrations increase moving further downgradient from Desert Center (to the southeast) and are highest in the central and eastern parts of the basin (Steinemann 1989). In general, the groundwater in the basin has concentrations of sulfate, chloride, fluoride, and dissolved solids too high for domestic use and concentrations of sodium, boron and dissolved solids too high for irrigation use (DWR 1975). Several of the wells sampled in the basin contain high levels of fluoride and boron.

2. WATER QUALITY MONITORING SYSTEMS

2.1 GROUNDWATER MONITORING NETWORK

A groundwater monitoring network (GMN) will be established at the project site to monitor groundwater for impacts from potential releases from the six proposed evaporation ponds (three for each 125MW unit) and the proposed LTU. The proposed GMN will consist of a combination of 3 new proposed on-site monitoring wells (MW-1, MW-2 and MW-3) (refer **Figure 2**).

The depth to groundwater below the Site, measured in 2009, ranged from 70 to 90 feet below ground surface (bgs). In general, groundwater flow in the basin is south-southeastward (refer **Figure 3**). The groundwater gradient is the steepest in the western half of the basin and is nearly flat in the central portion of the basin (DWR, 1963). Near Ford Dry Lake and east of Ford Dry Lake the gradient becomes steeper as groundwater approaches the narrows in the southeast portion of the basin (Steinemann, 1989; DWR 1963).

2.1.1 REGIONAL GROUNDWATER

The proposed GMN layout for sampling regional groundwater basin includes three detection wells; one up gradient and two downgradient of the evaporation ponds and LTU (refer **Figure 2**).

The depth to groundwater under the waste management units is expected to be 90 feet bgs, so the wells will be screened between approximately 80 feet bgs (10 feet above the water surface table) and 110 feet (20 feet below the water table surface level) to allow for potential water level fluctuations. The total depth of the groundwater wells would be approximately 120 feet.

2.1.2 SHALLOW (PERCHED) GROUNDWATER

Shallow (perched) groundwater is not anticipated to occur at the site. However, the potential presence for perched aquifers beneath the project site will be evaluated during installation of the proposed monitoring wells.

If perched groundwater or potential perching strata are encountered during the installation of the proposed water table monitoring wells, then additional wells may be installed to evaluate the perched groundwater or monitor the vadose zone above the perching strata. The criteria for adding wells will include the areal and vertical extent of the perched groundwater and the temporal nature of the perched groundwater. The decision to install the shallow wells would be made after the three proposed wells have been completed and well logs as well as geophysical logs can be reviewed.

2.1.3 INSTALLATION OF NEW WELLS

Steps associated with installing a new well are described below.

1. Well installation permits will be obtained from the Riverside County Department of Health Services;
2. Well locations will be cleared for utilities, by notifying Underground Service Alert and having a third party underground utility locator perform a utility clearance geophysical survey;
3. Wells will be installed using air/mud rotary or auger drilling methods in accordance with all local and state regulations and requirements. Borings will be sampled a minimum 5-foot vertical intervals and logged under the supervision of a California Professional Geologist in accordance with the Unified Soil Classification System (USCS). A boring log will be prepared for each boring. Soil samples may be retrieved for laboratory analysis of geotechnical soil properties (e.g., gradation, permeability), if warranted.
4. The boreholes will be evaluated for the potential existence of perched groundwater or significant and laterally continuous perching layers. If these are encountered, additional recommendations for completion of shallow monitoring or interface wells will be submitted to the CRBRWQCB for review and approval.
5. The monitoring wells will be constructed with 4-inch Schedule 80 PVC well casing. The screen interval for each monitoring well will be sufficient to allow for monitoring of the regional groundwater under both static and dynamic (pumping) conditions. The screen opening (slot size) will be based on the screen interval lithology. The monitoring well will be centered in the borehole using centralizers placed in the well screened interval.
6. Filter pack material will be placed in the annular space between the well screen and borehole using a tremie pipe. As with the screen opening, the filter pack material will be dependant on the lithology and the chosen screen opening. The filter pack will extend a minimum of five feet above the screen interval.
7. An annular seal, consisting of a ten sack sand/cement grout or bentonite-cement ground, will be placed between the well casing and the borehole to within five feet of the surface using a tremie pipe which will also prevent entry of contaminants from the ground surface.
8. The monitoring well surface completion will consist of a traffic-rated, flush-mount or monument-type well box set into a concrete pad that extends to the top of the grout seal.
9. Following the surface completion, the monitoring well will be developed to remove drilling mud or fines from the borehole, filter pack and surrounding formation, remove fines from the filter pack, and to ensure proper groundwater connection to the surrounding formation.

10. After the monitoring well has been developed, a dedicated pump will be placed in the well. The pump will be set so that the pump intake is between five and six feet below the top of the water table.

Field activities including drilling, well installation, well development, groundwater sampling, field analytical procedures, and record keeping will be performed using the standard operating procedures. Copies of the driller's logs will be provided to the Department of Water Resources as required pursuant to section 13751 of the California Water Code and the Colorado River Basin Regional Water Quality Control Board (CRBRWQCB). Field activities will be performed under the oversight of a California-registered Professional Geologist.

2.2 SURFACE WATER

All upstream ephemeral drainage lines are diverted around the project site, preventing interaction between a release for the waste management units and the ephemeral drainage lines. On the project site, there are a series of swales, ditches and detention ponds. Stormwater run off from around the evaporation ponds and LTU is intercepted by a drainage ditch and directed into the detention pond.

If there were a release of wastewater to the ground surface, a portion may run into the detention basin downstream of the pond and LTU area, depending on the quantity and flow rate of the release; however, it is more likely that it would infiltrate through the ditches.

Therefore it is proposed to undertake testing of the detention basin if there has been evidence of a surface release from a waste management unit to determine if the onsite water in the detention basin is impacted. There are no permanent surface water bodies established on the project site to facilitate a surface water monitoring system with background monitoring points.

2.3 UNSATURATED ZONE

An unsaturated zone monitoring system will be established for the evaporation ponds and LTU.

2.3.1 EVAPORATION PONDS

There will be a pipe installed under each evaporation pond to check for the presence of excessive moisture or liquids on a semi-annual basis using a neutron probe. This moisture detection monitoring program must be undertaken by a trained, certified and licensed technician as the neutron probe uses radioactive material.

Moisture in the soil is detected by the speed that the neutrons move and scatter when emitted. The soil causes neutrons to slow however if the soil is dry, the cloud of neutrons will be less dense and extend further from the probe and if the soil is wet, the neutron cloud will be more dense and extend a shorter distance (Risinger & Carver 2009).

The density of the cloud is measured by a detector and results are displayed electronically on the front panel. The measurement is the total water content in the soil, therefore the background levels of water moisture in the soil must be removed to assess if any additional moisture has been released from the evaporation pond liner system (Risinger & Carver 2009).

Prior to the discharge of any waste water into the ponds, soil moisture measurements will be taken to establish background soil moisture levels. Neutron probe measurements will be taken beneath each pond at least four times in order to determine a value that is statistically representative of background moisture conditions.

Once the evaporation ponds become operational and wastewater is discharged to the ponds, moisture detection monitoring will be performed on a semi-annual basis. For each monitoring event neutron probe measurements will be performed beneath each pond. A statistical analysis will be performed comparing the results to the background soil moisture level using the statistical methods described in **Section 4.4**. If the moisture content is statistically significantly higher than the background value, then field verification testing will be performed and the CRBRWQCB will be notified with a report of physical evidence of a release. Field verification testing may consist of a combination of the following measures: additional neutron analysis, laboratory analysis of liquids drawn from the neutron probe casing, and visual observation to verify existence of a release.

2.3.2 LAND TREATMENT UNIT

Prior to the discharge of any HTF impacted soil into the LTU, soil samples will be taken to collected and analyzed to establish background concentration in the soil. Annually, soil samples will be collected at a depth of 1 foot below the compacted soil base at the LTU (approximately 3 feet below ground level) and analyzed for the constituents of concern (COC) using modified EPA Method 8015 to verify that HTF is not migrating below the 5-foot treatment zone underlying the unit (refer **Table 4**). If results of sample analysis indicate HTF concentrations greater than the laboratory detection limit, soil sample collection will be repeated at 1-foot intervals until laboratory analytical results show that concentrations are less than the laboratory detection limit. If HTF concentrations above the laboratory detection limit are found below the 5-foot treatment zone, the Facility will implement the Contingency Plan and/or Corrective Action Program and submit a letter to the CRBRWQCB highlighting the “evidence of a release.” Results of sample analysis will be reported annually.

3. GROUNDWATER WATER QUALITY PROECTION STANDARDS

3.1 BACKGROUND VALUES

Groundwater samples will be collected from the new installed wells and analyzed to establish background water quality concentrations. This initial background sampling will consist of four quarters of groundwater sampling and analysis. All four quarters of data will be collected prior to the discharge of wastes into the evaporation ponds and LTU. This data will represent existing or static (non-pumping) hydrogeologic conditions. When the facility becomes operational and groundwater is pumped from other on-site groundwater wells to provide process water, the hydrogeologic conditions beneath the Site will become dynamic and the condition will remain dynamic for the life of the facility. For this reason, groundwater samples from the first quarterly sampling under the pumping conditions will be evaluated and with prior CRBRWQCB concurrence, may also be considered background. Groundwater samples will be analyzed for the parameters listed on **Table 1**. Background groundwater data will be evaluated statistically using the methods described in **Section 4.4**.

During project site construction activities, groundwater may be used for dust suppression and other construction uses. When this water use occurs, additional groundwater monitoring and sampling will be performed. Depending on the projected time-frame for construction water use, it is anticipated that up to three additional rounds of groundwater sampling will be performed. The first construction sampling would occur approximately one week after groundwater pumping commenced, the second round of sampling would be near the middle of the groundwater pumping and the final sampling event would occur approximately two days prior to pumping ceasing.

3.2 CONSTITUENTS OF POTENTIAL CONCERN

The constituents of potential concern (COPC) is generally a list includes all waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the evaporation ponds and LTU.

The estimated raw water quality used in the Project and the estimated concentration of constituents in the discharge to the evaporation ponds is outlined in **Table 2**. The chemical additives included in the Project process, which may also discharge to the evaporation ponds, are outlined in **Table 3**. The constituents expected in the LTU are shown on **Table 4**, which is directly sourced from the HTF used in the solar parabolic troughs.

As shown in **Table 2**, there are several parameters that will have higher concentrations in the evaporation ponds than in the raw water supply. A final list of constituents of concern can not be undertaken until the background sampling is completed, but it could contain arsenic, fluoride and molybdenum based on current raw water quality knowledge.

3.3 CONCENTRATION LIMITS

Under *CCR Title 27, Section 20400*, concentration limits of for each COC are to be established, including determination of background values. As outlined in **Section 3.1**, background values will be determined prior to the discharge of wastes into the evaporation ponds and LTU. The background value shall be used as the concentration limit unless there is more than one background condition within the aquifer or if a concentration limit greater than background (CLGB) has been established in a corrective action program (CAP) in the future.

3.4 MONITORING POINTS / POINTS OF COMPLIANCE

As outlined in **Section 2.1.1**, there are 3 monitoring points (MW-1, MW-2 and MW-3). The one point of compliance well will be MW-3, located south east of the evaporation ponds (refer **Figure 2**).

3.5 COMPLIANCE PERIOD

Genesis Solar, LLC anticipates that the Project will have a useful life of at least 30 years, and will seek approvals for at least that period of time. After the useful life is completed, the evaporation ponds and LTU will undergo clean closure, therefore the expected compliance period is 31 years.

4. MONITORING REQUIREMENTS

4.1 QUALITY ASSURANCE

Standard operating procedures for the following practices will be undertaken (refer **Appendix A**).

- Drilling;
- Well Design;
- Well Development;
- Water Sampling;
- Field Documentation;
- Field Log Book;
- Soil Logging;
- Filterpack Well Screen;
- Field Analytical Procedures; and
- Drilling Equipment Decontamination.

4.2 ROUTINE MONITORING

Following this, groundwater samples will be analyzed on a quarterly basis. All monitoring wells will be sampled using dedicated pumps and low-flow sampling techniques. The procedures for monitoring well sampling are presented in the SOP for water sampling in **Appendix A**.

Groundwater will be sampled and analyzed from each monitoring well on a quarterly basis. After water levels are measured in each well, each well will be purged and sampled using low-flow groundwater sampling techniques (see **Appendix A**). Groundwater samples from the first, second and third quarterly events will be analyzed for the parameters listed in **Table 1** with a “quarterly” monitoring schedule. The parameters analyzed in the fourth quarter monitoring event are also referred to as the “Annual” monitoring schedule in **Table 1**.

4.3 DATA RECORD & FORMAT

Genesis Solar will maintain a record of water quality analytical data as measured and in any form necessary for implementing the data analysis procedures proposed in **Section 4.4**.

4.4 DATA ANALYSIS

For each monitoring event, the concentration of each sampled parameter will be compared to the concentration limit to determine if there is “measurably significant” evidence of a release from the evaporation ponds or LTU.

To determine “measureable significant”, a graphical and statistical trend analysis of the groundwater monitoring data will be undertaken.

4.4.1 GRAPHICAL ANALYSIS

Time series graphs of groundwater chemical data will be presented. Graphs will be at a scale appropriate to show trends or variations in water quality. Wells that have been primarily below detection limits for a given constituent will not be graphed.

Maps illustrating the groundwater flow direction and chemical data (e.g., chloride, nitrate as nitrogen, phosphate, sulfate, total dissolved solids (TDS), biphenyl oxide, and diphenyl oxide will be presented.

4.4.2 STATISTICAL TREND ANALYSIS

A trend is defined as the general increase or decrease in observed values of some variable over time. Trend analysis can be used to determine the significance of an apparent trend and to estimate the magnitude of that trend. The Mann Kendall trend test and the Sen's slope estimator were chosen to statistically analyze the data because they are the accepted non parametric trend analysis methods for data that are not normally distributed.

Mann Kendall Trend Test. The test will be conducted on the wells to evaluate the existence of significant trends. The Mann Kendall Statistic (S) is assumed to be zero when there is no trend within the data or not enough data to predict a trend. S is calculated by the following equation:

$$S = \sum_{k=1}^{n-1} \sum_{j=k+1}^n \text{sign}(x_j - x_k)$$

Where: n = number of data points

x_j = data point at time j

$\text{sign}(x_j - x_k)$ = 1 if $x_j - x_k > 0$
= 0 if $x_j - x_k = 0$
= -1 if $x_j - x_k < 0$

The resulting statistic is the number of positive differences minus the number of negative differences. A very high positive value of S indicates an increasing trend while a very low negative value of S indicates a decreasing trend.

Sen's Slope Estimator. This simple procedure developed by Sen (1968) is used to estimate the slope or rate of change of the parameters in question. The advantage of this method over simple linear regression is that it is not greatly affected by gross data errors or outliers, and can even be computed when data are missing.

The slope is estimated as a change in measurement (x) per change in time (i):

$$Q = \frac{X_{i'} - X_i}{i' - i}$$

where:

Q = slope between data points $X_{i'}$ and X_i

$X_{i'}$ = data measurement at time i'

X_i = data measurement at time i

i' = time after time i

Sen's slope estimate is based on the medium slope of Q:

$$\begin{aligned} \text{Sen's Slope Estimate} &= Q_{(N'+1)/2} && \text{if } N' \text{ is even} \\ &= 1/2 \{Q_{(N'/2)} + Q_{[(N'+2)/2]}\} && \text{if } N' \text{ is odd} \end{aligned}$$

where:

N' = number of calculated slopes (i.e. number of data pairs for which $i' > i$)

4.5 RESPONSE TO RELEASE

If there is a “measurably significant” evidence of release, based on the **Section 4.4** or physical evidence of a release, Genesis Solar LLC will immediately notify the CRBRWQCB staff verbally of any finding and shall provide written notification via certified mail within seven days of such a determination. The notification shall include the following information:

- Evaporation Pond / LTU that may have released or be releasing;
- General information including the date, time, location and cause of the release;
- An estimate of the flow rate and volume of the waste involved;
- A procedure for collecting samples and description of laboratory tests to be conducted;
- Identification of any water bearing media affected or threatened;

- A summary of proposed corrective actions; and
- For statistically significant evidence of a release - monitoring parameters and/or constituents of concern that have indicated statistically significant evidence of a release from the evaporation pond; or
- For physical evidence of a release - physical factors that indicate physical evidence of a release.

Upon notification, Genesis Solar LLC may initiate verification procedures or demonstrate that source other than the evaporation ponds, caused the evidence of a release. A supporting technical report must be provided to the CRBRWQCB within 90 days demonstrating the different source of the discharge. If, after the verification period, there was still a “measurably significant” evidence of release, Genesis Solar LLC may the following procedures (pursuant to CCR Title 27 Section 20420(k):

- Non Statistical COC Scan – collect and analyze a single water sample from each monitoring point in the affected medium;
- Within 90 days, submit an amended RoWD to establish an Evaluation Monitoring Program (EMP) which shall include the COC concentrations from the most recent sampling event, proposed monitoring changes and proposed delineation approach. This shall meet the requirements of CCR Title 27 Section 20425; and
- Within 180 days, submit an engineering feasibility study (EFS) for a corrective action program necessary to meet the requirements of CCR Title 27 Section 20430.

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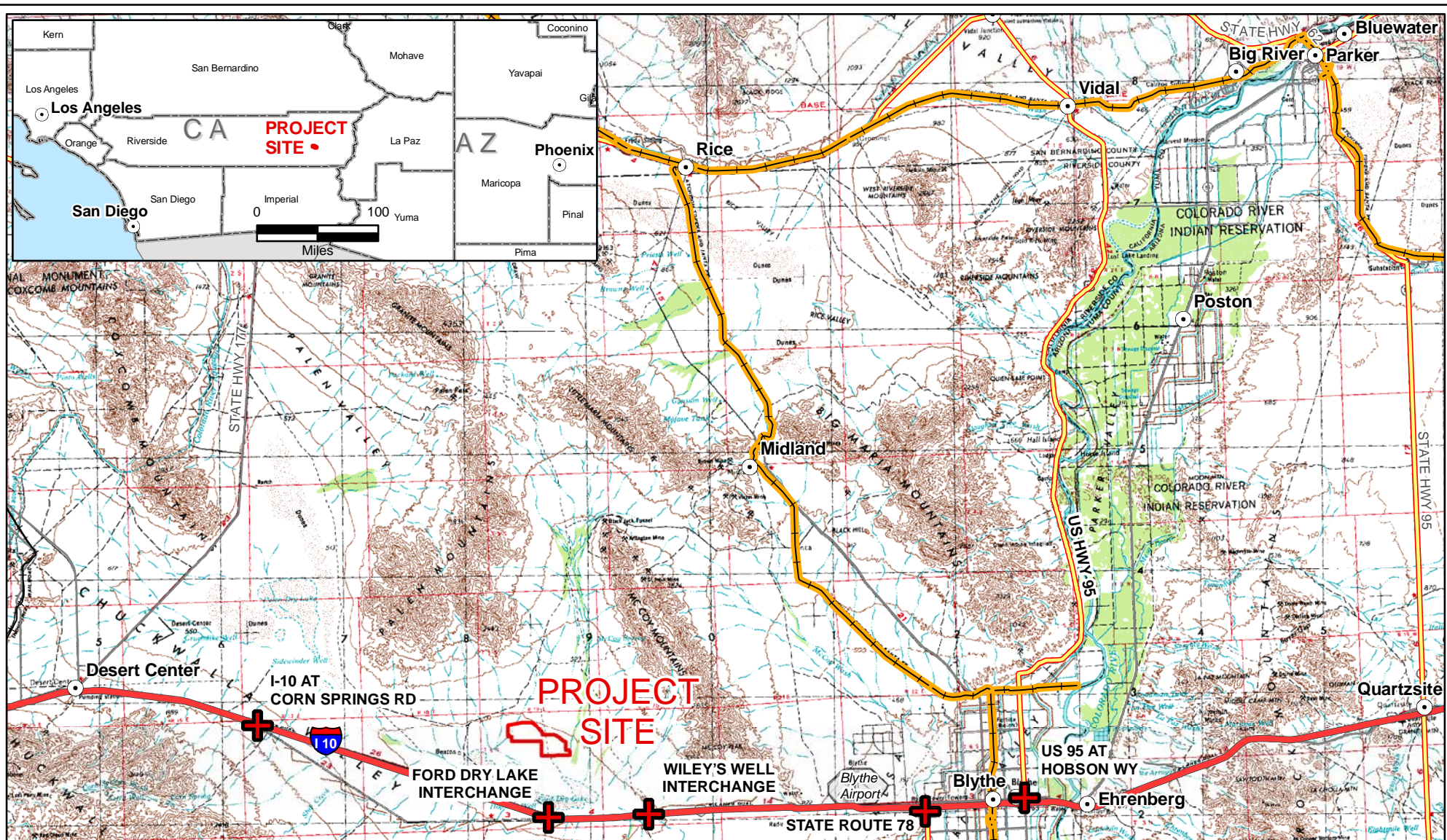
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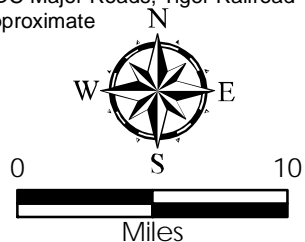
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FIGURES



SOURCE:
USGS 250K Quad Sheet, Salton Sea, Needles
ESRI Cities, SDC Major Roads, Tiger Railroad
All locations approximate



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LOCATION MAP

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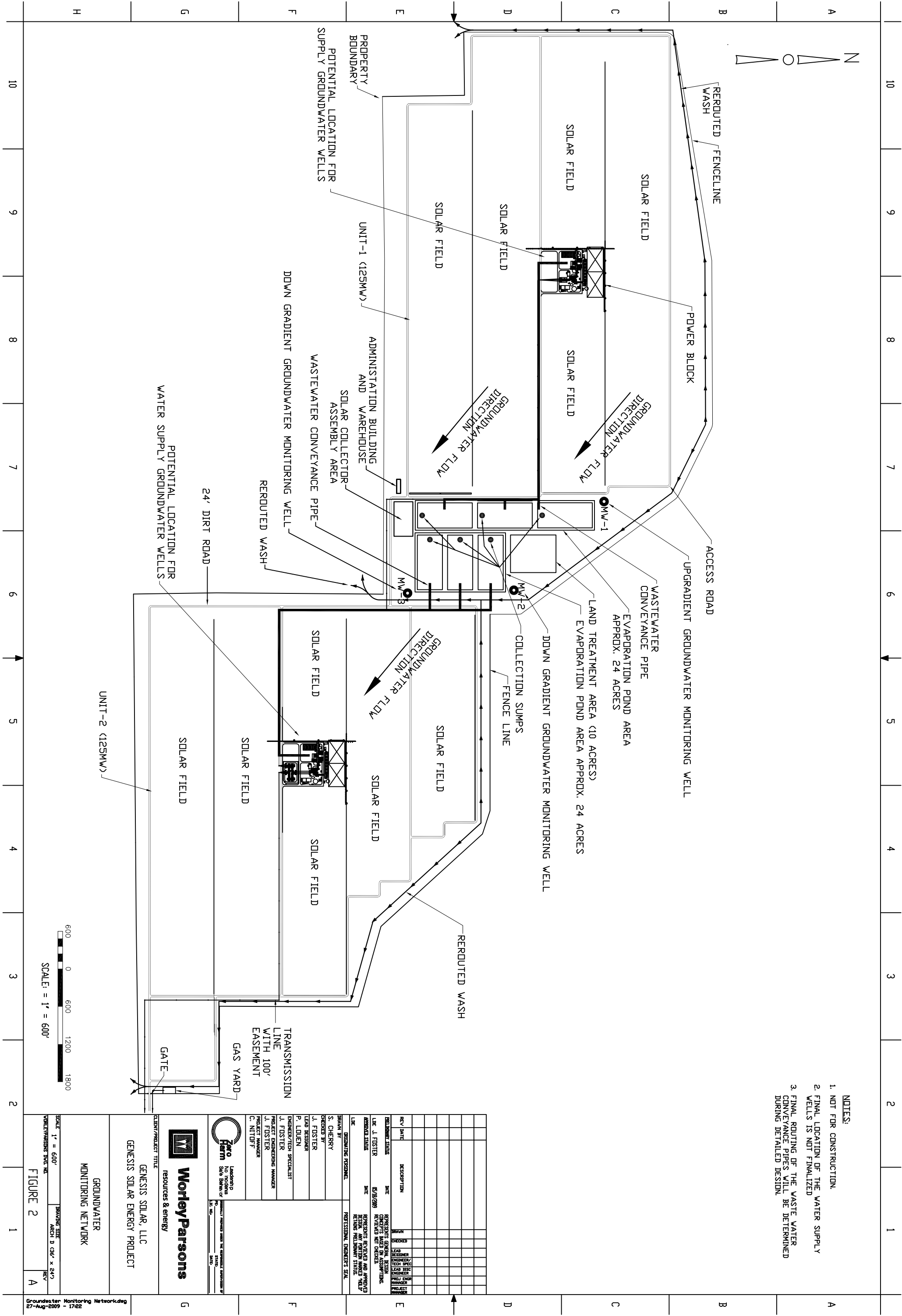
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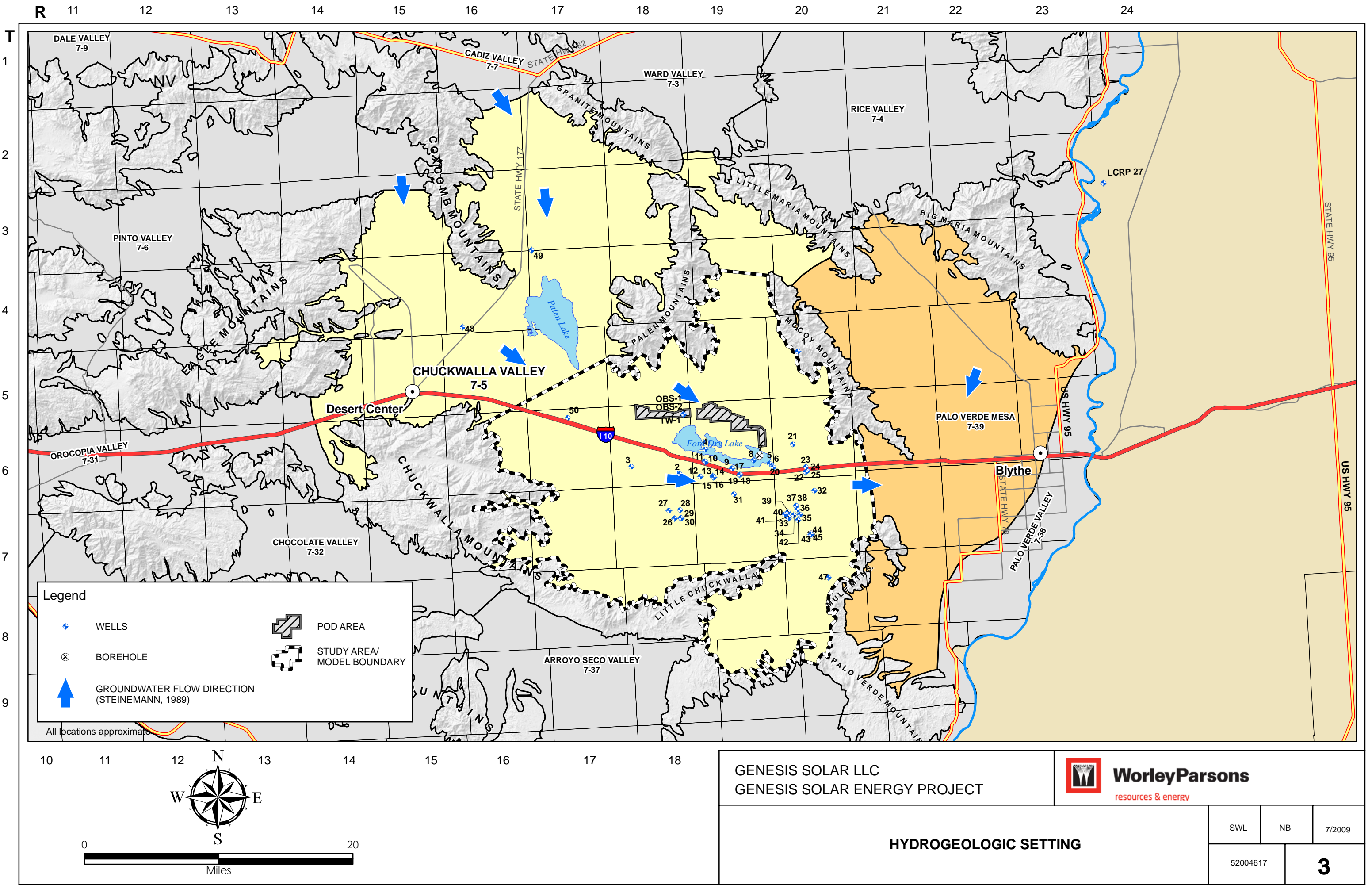
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- NOTES:
1. NOT FOR CONSTRUCTION.
 2. FINAL LOCATION OF THE WATER SUPPLY WELLS IS NOT FINALIZED
 3. FINAL ROUTING OF THE WASTE WATER CONVEYANCE PIPES WILL BE DETERMINED DURING DETAILED DESIGN.





TABLES



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Table 1
Groundwater Monitoring Sampling Parameters
Genesis Solar Energy Project

Parameter	Unit	U.S. EPA or Standard Method	RL Goal	Monitoring Schedule		Potential Constiuent of Concern
				Quarterly	Annual	
Ammonia	ug/L As N	350.1	100		✓	TO BE COMPLETED WHEN THE FOUR QUARTLY BACKGROUND GROUNDWATER WELL SAMPLING EVENTS HAVE BEEN CONDUCTED
Aluminum	ug/L	200.7	20		✓	
Arsenic	ug/L	6020	2		✓	
Boron	ug/L	200.7	140		✓	
Calcium	ug/L	200.7	40,000		✓	
Chloride	ug/L	300	14,000	✓	✓	
Cyanide	ug/L	SM 4500	10		✓	
Fluoride	ug/L	300	500		✓	
Iron	ug/L	200.7	20		✓	
Magnesium	ug/L	200.7	10,000		✓	
Manganese	ug/L	200.7	15		✓	
Molybdenum	ug/L	6020	10		✓	
Nitrate as nitrogen	ug/L	300	1,000	✓	✓	
Nitrite as nitrogen	mg/l	SM 4500	4		✓	
Phosphate	mg/l	365.3	100	✓	✓	
Potassium	mg/l	200.7	3,000		✓	
Selenium	mg/l	6020	0.5		✓	
Silica	mg/l	200.7	1,000		✓	
Silicon	mg/l	200.7	1,000		✓	
Sodium	mg/l	200.7	10,000		✓	
Strontium	mg/l	200.7	500		✓	
Sulfate	mg/l	300	100,000	✓	✓	
Total dissolved solids	mg/l	SM 2450C	10,000	✓	✓	
Total alkalinity	mg/l as CaCO ₃	SM 2320B	100,000		✓	
Zinc	mg/l	6020	10		✓	
Biphenyl	mg/l	8015M	1,000	✓	✓	
Diphenyl	mg/l	8015M	1,000	✓	✓	
Static Water	feet bgs	Field	+/- 0.1		✓	
Temperature	°F or °C	Field	+/- 0.1		✓	
pH	pH	Field	+/- 0.1		✓	

Notes:

ug/L – micrograms per liter

RL – reporting limit

SM – Standard Method



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Table 2
Predicted Chemistry of Raw Water and Wastewater Streams
Genesis Solar Energy Project

Stream Title	Raw / Makeup Water (as mg/L)	Cooling Tower Blowdown	3 Streams that feed into the Evaporation Ponds			Combined Discharge to Evaporation Pond
			Pre-Treatment MMF Backwash	Post-Treatment MMF Backwash	Post-Treatment 2nd Stage RO Reject	
Arsenic	0.009	0.006	0.009	0.030	0.114	0.089
Barium	0.03	0.02	0.03	0.11	0.41	0.32
Calcium	66	42	66	213	818	641
Chloride	2,300	1,449	2,300	7,408	28,496	22,349
Dissolved Silica	15	9	15	48	186	146
Fluoride	1.1	0.7	1.1	3.5	13.6	10.7
Iron	0.46	0.29	0.46	1.48	5.70	4.47
Magnesium	14	9	14	45	173	136
Manganese	0.03	0.02	0.03	0.09	0.36	0.28
Molybdenum	0.2	0.15	0.24	0.77	2.97	2.33
Nitrate	0.50	0.31	0.50	1.61	6.19	4.86
Potassium	12	8	12	39	149	117
Sodium	1,500	945	1,500	4,831	18,585	14,575
Sulfate	810	510	810	2,609	10,036	7,871
TDS	5,000	3,150	5,000	16,105	61,948	48,584
Total Alkalinity (as CaCO ₃)	150	94	150	483	1,858	1,458
Total Hardness (as CaCO ₃)	220	139	220	709	2,726	2,138
pH	7.80	8.20				
Specific Cond (uS/cm @ 25C)	8,800	5,543	8,800	28,345	109,029	85,508

Notes:

Regulatory Standards/Reportable Quantities are for elements mentioned only

* Not listed/no standards



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Table 3
Chemical Additives in Treatment Process
Genesis Solar Energy Project

Process	Aim	Type of Additive	Example of Additive
Circulating Water	Limit growth of bacteria	Oxidizing Biocide	Sodium Hypochlorite
	Limit formation of scale	pH Control	Sulfuric Acid, Hydrochloric Acid (included in Tables 5 and 7)
		Antiscalants	Organic Phosphates (used in small amounts)
	Minimize corrosion	Corrosion Inhibitors	Zinc, Phosphate (used in small amounts)
Pre- and Post- Treatment MMF and RO Units	Anti-Scalantant	Reverse Osmosis Anti-Scalant	Nalco PermaTreat_PC_191
	Coagulant and Flocculant	Multi-media Filter	Nalco NALCLEAR_7768



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Table 4

**Parameters in the Waste Steams into the Land Treatment Unit
Genesis Solar Energy Project**

Parameter	Unit
Biphenyl Oxide	mg/l
Diphenyl Oxide	mg/l

APPENDIX A: STANDARD OPERATING PROCEDURES

TO BE PROVIDED IN FINAL VERSION OF DETECTION MONITORING PROGRAM

APPENDIX D: CORRECTIVE ACTION PLAN

GENESIS SOLAR ENERGY PROJECT

CORRECTIVE ACTION PROGRAM

Submitted to:

California Regional Water Quality Control Board
Colorado River Basin Region

Submitted by:

Genesis Solar, LLC

With technical assistance from:

WorleyParsons Group, Inc.

August 21st 2009

CORRECTIVE ACTION PROGRAM
GENESIS SOLAR ENERGY PROJECT

Prepared By:

Janine Forrest

Date

Reviewed By:

Bob Anders, California Registered Professional Engineer, as an employee of WorleyParsons, with expertise in civil engineering, has reviewed the report with the title "Corrective Action Program". His signature and stamp appear below.

Bob Anders, PE

Date

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FIGURE 1: LOCATION PLAN

FIGURE 2: GROUNDWATER MONITORING NETWORK

1. INTRODUCTION

This report presents a Corrective Action Program (CAP) for the proposed Genesis Solar Energy Project (“Project”), located in the Colorado Desert between the communities of Blythe, CA (approximately 24 miles east) and Desert Center, CA (approximately 27 miles west).

Genesis Solar, LLC, is proposing to construct, own and operate the Project on an approximate 1,800-acre site near Ford Dry Lake in Riverside County, California (refer **Figure 1**). The Project is a concentrated solar power (CSP) electric generating facility that will use a proven parabolic trough solar thermal technology. The troughs will concentrate the sun’s heat on tubes carrying a petroleum-based Heat Transfer Fluid (HTF) that will be used for steam production. The steam in turn will be used to power a steam turbine generator.

Genesis Solar LLC proposes to use three evaporation ponds per 125 MW Unit (total of 6 evaporation ponds on site) and a land treatment unit (LTU) as part of the Project. The evaporation ponds will receive, store and evaporate wastewater from operations at the Project site. The LTU will receive, temporarily store and treat soil that has been impacted by occasional leaks and spills of HTF.

This CAP is specific to the evaporation ponds and LTU associated with the Project.

1.1 PURPOSE

This CAP is intended to be a stand alone separable document to the application for Report of Waste Discharge (RoWD) / Joint Technical Document (JTD) for the Project, in accordance with the *California Integrated Waste Management Board (CIWMB) Title 27 Regulations, Division 2, Subdivision 1*, requirements for CAP (refer **Section 1.2**).

The RoWD/JTD contains supplementary information such as evaporation ponds and LTU design and construction standards, contingency plan and detection monitoring program (DMP).

1.2 REGULATORY REQUIREMENTS

There are references to contingency plans and corrective action programs in the following sections of *California Code of Regulations (CCR), Title 27 Environmental Protection, Division 2 Solid Waste, Subdivision 1*:

- *Chapter 3, Subchapter 3, Article 1, Section 20385* – Required Programs: Lists ‘Corrective Action Program’ to remediate releases from a unit
- *Chapter 3, Subchapter 3, Article 1, Section 20400* – Concentration Limits: For each constituent of concern (COC), a concentration limit must be set. A concentration limit greater than background (CLGB) may be used in a CAP if it is technologically and economically infeasible to achieve the background limit.

- *Chapter 3, Subchapter 3, Article 1, Section 20415* – General Water Quality Monitoring and System Requirements:
 - For Groundwater: Outlines monitoring point requirements to yield groundwater samples from the uppermost aquifer, zone of saturation and zone of perched water;
 - For Surface Water: Outlines monitoring point requirements to yield samples from each surface water body that provides an evaluation of compliance and effectiveness of the CAP;
 - For Unsaturated Zone Monitoring: Outlines monitoring point requirements to yield soil pore liquid samples or soil pore liquid measurements that provides an evaluation of compliance and effectiveness of the CAP.
- *Chapter 3, Subchapter 3, Article 1, Section 20430* – Corrective Action Program: Outlines the requirements for the Corrective Action Program

1.3 OBJECTIVES

The objective of the CAP is to ensure that if there is a release by the evaporation ponds or LTU, the COC's achieve their respective concentration limits at all monitoring points and throughout the zone affected by the release, including any portions thereof that extend beyond the facility boundary, by removing the waste constituents or treating them in place. Genesis Solar LLC will be required to achieve compliance with the water standards adopted for the Project.

The DMP for the Project provides the procedure for evaluating if there has been a “measurably significant” release and the water standards for the Project (refer **Appendix C** of the RoWD/JTD).

2. CORRECTIVE ACTIONS AND MONITORING

The following section outlines the scope of actions that may be undertaken to remediate a release from a waste management unit. The correction actions address the three required monitoring systems under CCR Title 27 Section 20415; groundwater, surface water and unsaturated zone.

2.1 GROUNDWATER

A groundwater monitoring network (GMN) has been proposed for the evaporation ponds and the LTU (refer to the DMP, **Appendix C** of the RoWD/JTD). The DMP presents the sampling schedule, analytes and reporting requirements for the Site under CCR Title 27.

For the CAP, the same GMN established for the DMP shall be used as monitoring points to yield groundwater samples from the uppermost aquifer, zone of saturation and from perched groundwater zones to provide the data needed to evaluate the effectiveness of the CAP.

2.1.1 REGIONAL GROUNDWATER

The proposed GMN layout for sampling regional groundwater basin includes three detection wells; one up gradient and two downgradient of the evaporation ponds and LTU (refer **Figure 2**).

2.1.2 PERCHED GROUNDWATER

As outlined in the DMP, shallow (perched) groundwater is not anticipated to occur at the site. However this shall be evaluated during installation of the proposed monitoring wells in the GMN. If perched groundwater is encountered during the installation of the proposed water table monitoring wells, then additional wells may be installed to evaluate the perched groundwater under the DMP.

If any of the release scenarios described in **Section 2.3** and perched groundwater zone(s) are identified at the Project Site, the need for perched groundwater monitoring wells would be assessed and would be dependant on the results of confirmation soil samples. If the confirmation soil samples indicated the COC's for the evaporation ponds and LTU were not detected, no perched zone wells would be installed. If confirmation soil samples contained detectable concentrations of evaporation pond and LTU COC's, additional perched monitoring wells would be installed if the existing wells did not adequately monitor the release area.

2.2 SURFACE WATER

As outlined in the DMP, all upstream ephemeral drainage lines are diverted around the project site, preventing interaction between a release for the waste management units and the

ephemeral drainage lines. On the project site, there are a series of swales, ditches and detention ponds.

If there was a release of wastewater to the ground surface, a portion may run into the detention basin subject to quantity and flow rate of the wastewater however it is more likely that it will infiltrate through the ditches and into the groundwater table.

Therefore it is proposed to undertake testing of the detention basin if there has been evidence of a release from a waste management unit to determine if the onsite water in the detention basin is contaminated and must be pumped and removed from the project site, rather than discharged into the downstream ephemeral waterway system. There are no permanent surface water bodies established on the project site to facilitate a surface water monitoring system with background monitoring points.

2.3 UNSATURATED ZONE

2.3.1 EVAPORATION PONDS

The following sections provide a description of the corrective actions to be taken should a release occur from the evaporation ponds.

The evaporation ponds are constructed with a leak detection layer and sump between the primary 60 mil high density polyethylene (HDPE) geomembrane liner and the secondary 40 mil HDPE geomembrane liner. Underlying the base of the ponds is a moisture detection system consisting of a network of carrier pipes installed at the sides and low point of each pond that a neutron probe is pulled through to measure the moisture content of the soil beneath the ponds.

An action leakage rate (ALR) is the allowable leakage allowed through the liner system (refer to the RoWD/JTD for the actual rate). If water is detected accumulating in the sump at a higher rate than the ALR, the following steps will be implemented:

- Water will be pumped out of the evaporation pond that exhibits the high ALR and placed in the other evaporation pond(s);
- The precipitated solids/sludge at the bottom of the pond will be sampled then removed or placed in a corner of the pond, allowing the hard surface/protective layer to be inspected for cracks;
- Once the location of the crack is determined, the hard surface/protective layer will be removed from the vicinity of the crack, the granular fill layer and non-woven geotextile layer will also be removed to expose the 60 mil HDPE primary liner;
- The liner will be repaired using new HDPE liner material and welded onto the primary HDPE liner;
- The non-woven geotextile layer will be replaced, the granular fill layer will be replaced and the hard surface/protective layer will be recast; and

CORRECTIVE ACTION PROGRAM
GENESIS SOLAR ENERGY PROJECT

- Within 24 hours of the release being detected, the CRRWQCB will be verbally notified of the release and a written notification via certified mail will be sent within seven days of determining there was a release.

If the moisture detection system located below the ponds detects the presence of moisture above the set action limit the following steps will be implemented:

- Water will be pumped out of the evaporation pond that exhibits the high moisture content and placed in the other evaporation ponds;
- The precipitated solids/sludge at the bottom of the pond will be sampled and will either be removed or placed in a corner of the pond of the pond, allowing the hard surface/protective layer to be inspected for cracks;
- Once the location of the crack is determined, the hard surface/protective layer will be removed from the vicinity of the crack or the location may be determined by the location of the neutron probe, the granular fill layer and non-woven geotextile layer will also be removed to expose the 60 mil HDPE primary liner;
- The leak detection HDPE geonet drainage media will be removed to expose the secondary HDPE geomembrane liner. If encountered, the sand backfill and leak detection piping will be removed;
- The damaged section of the 40 mil secondary HDPE liner will be removed, the clay base layer will be examined and if needed, wet soil will be removed;
- Soil samples will be collected from the native material to a depth of 5 feet below the clay base layer and analyzed for the COC's associated with the evaporation ponds;
- If required, soil will be excavated to the depth of the sampling;
- Clean fill will be used to backfill the excavation of the native soil and will be compacted, the base layer / GCL will be replaced and compacted;
- New 40 mil HDPE material will be welded to the secondary liner, sand backfill and leak detection piping will be reinstalled, and HDPE geonet drainage media will be replaced;
- New 60 mil HDPE material will be welded to the primary line;
- The granular fill will be replaced and the hard surface/protective layer replaced; and
- Within 24 hours of the release being detected, the RWQCB will be verbally notified of the release and a written notification via certified mail will be sent within seven days of determining there was a release.

If a release from the evaporation ponds occurs due to overtopping of the berms by stormwater or overfilling the ponds, the following will be carried out:

- The area outside berm will be assessed using visual means and soil samples will be collected and analyzed for COC's associated with the evaporation ponds, if the visual impacts are not readily evident;

- The impacted soil will be excavated and placed in the LTU;
- If the confirmation soil samples are non-detect for evaporation pond COC's, the excavation will be backfilled with native material; and
- Within 24 hours of the release being detected, the CRRWQCB will be verbally notified of the release and a written notification via certified mail will be sent within seven days of determining there was a release.

2.3.2 LAND TREATMENT UNIT

HTF will be in a solid form below 53.6 degrees Fahrenheit, is relatively insoluble in water (solubility approximately 25 milligrams per liter), combustible and has relatively low volatility (Solutia, 2006). Therefore, the potential for HTF to migrate through the base of the LTU is considered very small. The annual sampling and analysis of the soil beneath the base of the LTU, for COC's associated with the LTU has been judged to be sufficient at similar sites.

If HTF is detected in the soil beneath the treatment zone of the LTU, the following steps will be implemented:

- Soil will be removed from the vicinity of the sample location where the HTF was detected;
- The compacted base layer will be excavated;
- Native material will be excavated to the depth of the soil sample. Additional soil excavation, not to exceed a depth of 5 feet beneath the compacted base, will be performed if excessive moisture is encountered;
- The excavation will be backfilled and compacted with native material;
- The compacted base layer will be reinstalled; and
- Within 24 hours of the release being detected, the RWQCB will be verbally notified of the release and a written notification via certified mail will be sent within seven days of determining there was a release.

Should a severe storm event occur that fills up the LTU and allows water to overtop the berm, the following steps will be implemented:

- Standing water in the LTU will be inspected for the presence of HTF product or sheen. If none is present, the water will be pumped to the evaporation ponds. If HTF product or sheen is present, the water will be pumped to a temporary holding tank, characterized for disposal and transported to a properly permitted disposal facility;
- The area outside berm will be assessed using visual means and soil samples will be collected and analyzed for COC's associated with the evaporation ponds, if the visual impacts are not readily evident;
- The impacted soil will be excavated and placed in the LTU;

CORRECTIVE ACTION PROGRAM
GENESIS SOLAR ENERGY PROJECT

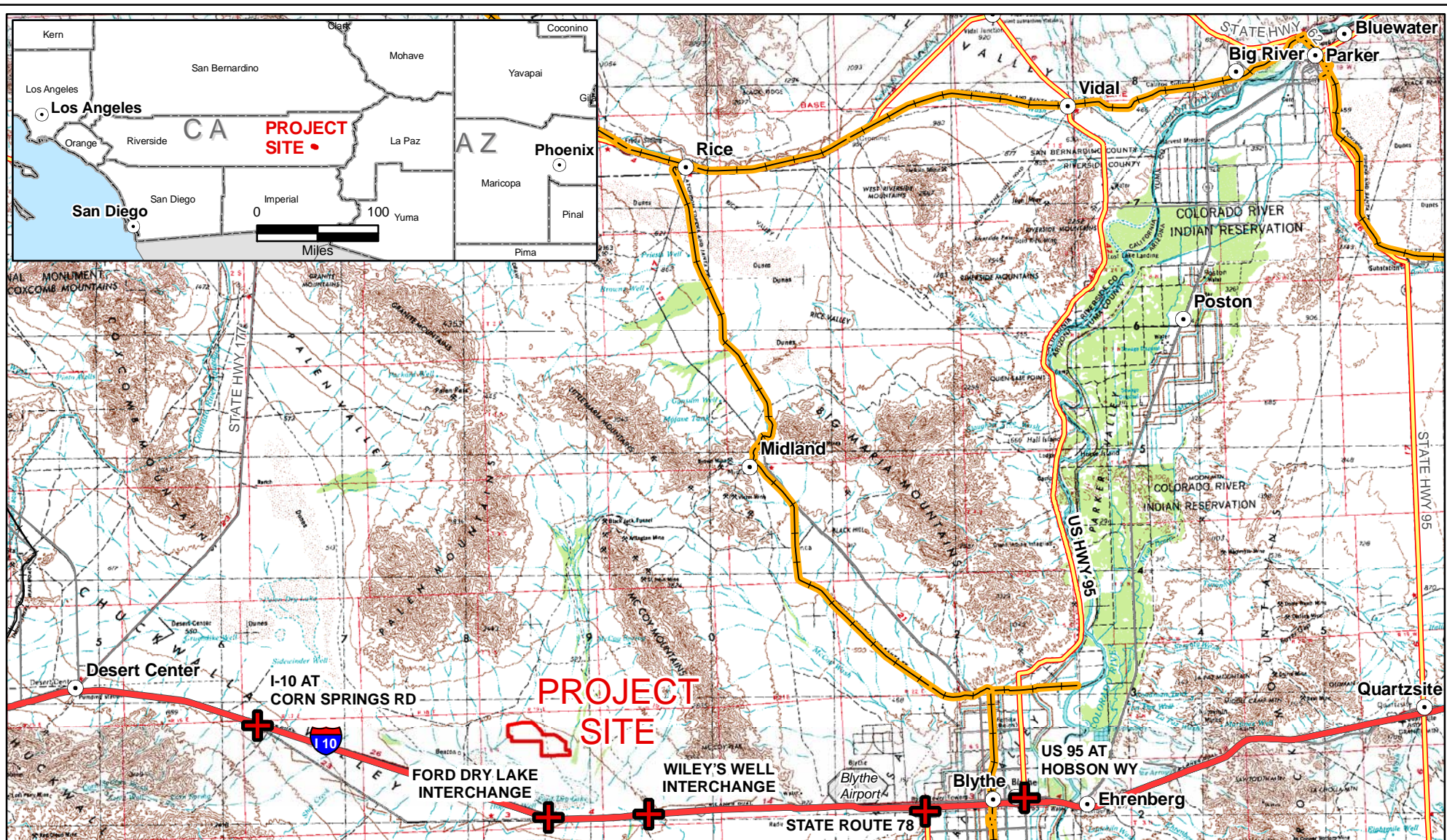
- If the confirmation soil samples are non-detect for evaporation pond COC's, the excavation will be backfilled with native material; and
- Within 24 hours of the release being detected, the CRRWQCB will be verbally notified of the release and a written notification via certified mail will be sent within seven days of determining there was a release.

3. CORRECTIVE ACTIONS SCHEDULE AND REPORTING

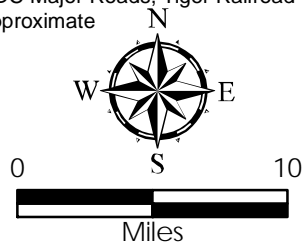
Genesis Solar LLC will initiate and complete the corrective action measures within a timeframe specified by the CRRWQCB. The extent of implementation of the CAP will be dependant on the type of release from the waste management unit. Generally, the CAP will be terminated when the concentrations of all of the COC's are at or below the water quality standard set for the Project.

Genesis Solar LLC will provide semi-annual progress reports to the CRRWQCB on the effectiveness of the CAP however more frequent reporting may be required by the CRRWQCB as necessary to ensure the protection of human health and the environment. Genesis Solar LLC may also submit an amended report of waste discharge with an amended CAP within 90 days of determining that the existing CAP does not satisfy the regulatory or project site requirements.

FIGURES



SOURCE:
USGS 250K Quad Sheet, Salton Sea, Needles
ESRI Cities, SDC Major Roads, Tiger Railroad
All locations approximate



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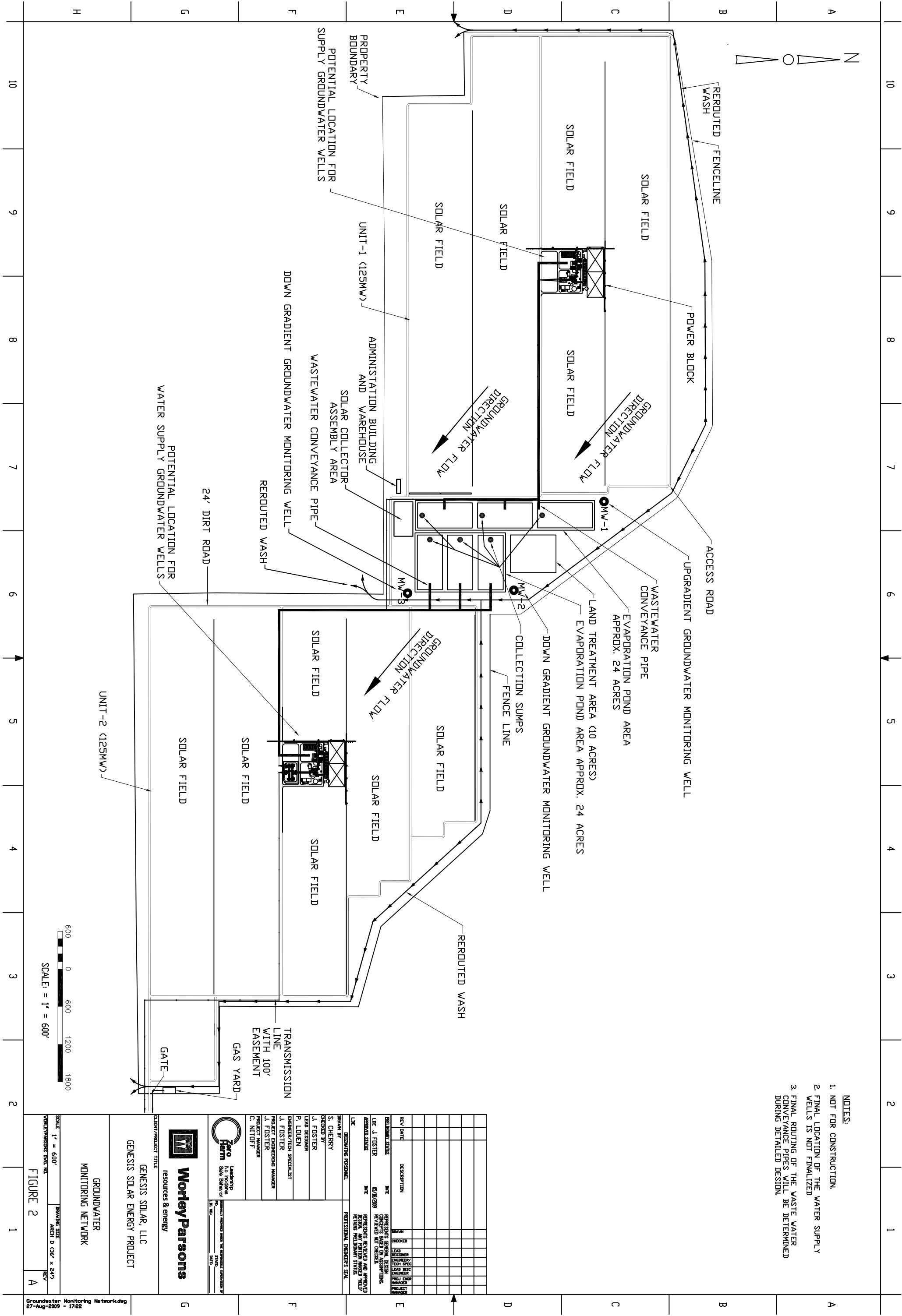
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LOCATION MAP

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- NOTES:
1. NOT FOR CONSTRUCTION.
 2. FINAL LOCATION OF THE WATER SUPPLY WELLS IS NOT FINALIZED
 3. FINAL ROUTING OF THE WASTE WATER CONVEYANCE PIPES WILL BE DETERMINED DURING DETAILED DESIGN.



**APPENDIX E: PRELIMINARY CLOSURE PLAN FOR
EVAPORATION PONDS**

GENESIS SOLAR ENERGY PROJECT

PRELIMINARY CLOSURE MAINTENANCE PLAN FOR EVAPORATION PONDS

Submitted to:

California Regional Water Quality Control Board
Colorado River Basin Region

Submitted by:

Genesis Solar, LLC

With technical assistance from:

WorleyParsons Group, Inc.

August 2009

PRELIMINARY CLOSURE MAINTENANCE PLAN
FOR EVAPORATION PONDS
GENESIS SOLAR ENERGY PROJECT

Prepared By:

Janine Forrest

Date

Reviewed By:

Bob Anders, California Registered Professional Engineer, as an employee of WorleyParsons, with expertise in civil engineering, has reviewed the report with the title "Preliminary Closure Maintenance Plan for Evaporation Ponds". His signature and stamp appear below.

Bob Anders, PE

Date

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FIGURE 2: SITE LAYOUT PLAN

FIGURE 3: EVAPORATION POND SECTION AND DETAILS

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APPENDIX A: CLOSURE COSTS

1. INTRODUCTION

This report presents a Preliminary Closure Maintenance Plan for the evaporation ponds for the proposed Genesis Solar Energy Project (“Project”), located in the Colorado Desert between the communities of Blythe, CA (approximately 24 miles east) and Desert Center, CA (approximately 27 miles west).

Genesis Solar, LLC, is proposing to construct, own and operate the Project on an approximate 1,800-acre site near Ford Dry Lake in Riverside County, California (refer **Figure 1**). The Project is a concentrated solar power (CSP) electric generating facility that will use a proven parabolic trough solar thermal technology. The troughs will concentrate the sun’s heat on tubes carrying a petroleum-based heat transfer fluid that will be used for steam production. The steam in turn will be used to power a steam turbine generator.

Genesis Solar LLC proposes to use three evaporation ponds (surface impoundments), for each 125 MW unit, which will receive, store and evaporate wastewater from operations at the Project site. This Preliminary Closure Maintenance Plan is specific to the surface impoundments associated with the Project.

1.1 PURPOSE

This Preliminary Closure Maintenance Plan for Evaporation Ponds is intended to be a stand alone separable document to the application for Report of Waste Discharge (RoWD) / Joint Technical Document (JTD) for the Project, in accordance with the *California Integrated Waste Management Board (CIWMB) Title 27 Regulations, Division 2, Subdivision 1*, requirements for closure (refer **Section 1.2**).

1.2 REGULATORY REQUIREMENTS

There are references to Closure Maintenance Plans in the following sections of *California Code of Regulations (CCR) Title 27 Environmental Protection, Division 2 Solid Waste, Subdivision 1*:

- *Chapter 3, Subchapter 5, Article 1, Section 20950* – General Closure and Post Closure Maintenance States: Outlines Final Closure Maintenance Plan requirements including closure supervision, surveying monuments, vegetation and financial assurance;
- *Chapter 3, Subchapter 5, Article 3, Section 21400* – Closure Requirements for Surface Impoundments: Outlines requirements clean-closure requirements;
- *Chapter 4, Subchapter 1, Article 2 Section 21570* – CIWMB Filing Requirements: Outlines completeness requirements for Preliminary or Final Closure Maintenance Plans;
- *Chapter 4, Subchapter 3, Article 4 Section 21750(i)* – Preliminary Closure Plan: Identifies the difference between Preliminary and Final Closure Maintenance Plans. In summary, a preliminary closure maintenance plan shall contain a generalized cost estimate for closure costs supported in sufficient detail to validate a plausibility of the estimate. For

PRELIMINARY CLOSURE MAINTENANCE PLAN
FOR EVAPORATION PONDS
GENESIS SOLAR ENERGY PROJECT

any Unit undergoing complete final closure of any portion of the Unit, the RoWD shall be amended to contain a Final Closure Maintenance Plan; and

- *Chapter 4, Subchapter 4, Section 21769 to 21900* – Outlines submittal requirements for Preliminary and Final Closure Maintenance Plans including cost analysis, financial assurance, closure schedule, final treatment procedures, and plan review.

1.3 OBJECTIVES

The objective of this plan is to meet the regulatory requirements for Preliminary Closure Maintenance Plan. The procedures described in this Preliminary Closure Maintenance Plan are designed to protect public health and safety and the environment.

A Final Closure Maintenance Plan will be submitted to the Colorado River Basin 7, Regional Water Quality Control Board (CRBRWQCB) as an amendment to the RoWD/JTD before undergoing complete final closure of any portion of the surface impoundments. In the Final Closure Maintenance Plan, the regulatory requirements listed in **Section 1.2** plus any revised applicable regulatory requirements shall be addressed. After the evaporation ponds have been closed, a Certification of Closure will be submitted for approval to the CRBRWQCB to ensure the evaporation ponds have been closed in accordance with the approved Final Closure Maintenance Plan.

The project goals for closure of the evaporation ponds are as follows:

- Remove all improvements within 3 feet of final grade; and
- Restore the lines and grades in the disturbed area of the evaporation ponds area to match the natural gradients.

2. EVAPORATION POND DESIGN

Wastewater from several processes within each 125MW Unit will be piped to three 8-acre evaporation ponds (total combined pond top area of 24 acres) for disposal. Therefore there is a total of 48 acres (top pond area) of evaporation ponds on the Project site

The 8 acre evaporation ponds have a proposed average design depth of 8 feet across each pond which incorporates:

- 3 feet of sludge build;
- 3 feet of operational depth; and
- 2 feet of freeboard.

The containment design for the evaporation ponds, from the surface of the evaporation ponds downwards, consists of the following:

- A hard surface / protective layer with granular fill/free draining sub-base over geotextile;
- A primary 60 mil high density polyethylene (HDPE) liner;
- An interstitial leak detection and removal system (LDRS) comprising a geomembrane geonet and collection piping;
- A secondary minimum 40 mil HDPE liner; and
- A base layer consisting of either a geosynthetic clay liner (GCL) or 2 foot of onsite material with a hydraulic conductivity of less than 1×10^{-6} cm/sec of which 30%, by weight, shall pass through a No. 200 Standard sieve.

The proposed location and design for evaporation ponds are provided in the following figures:

- **Figure 2:** Site Layout Plan
- **Figure 3:** Evaporation Pond Section and Details

3. CLOSURE STRATEGY

The Final Closure Maintenance Plan will outline in detail how each major task will be performed, however the overall closure strategy shall contain the following major elements:

- Conducting pre-closure activities, such as final closure and restoration planning, that addresses the “as-found” site conditions at the start of the project;
- Prepare a Construction Quality Assurance (CQA) Plan, certified by an appropriately registered professional to satisfy the requirements of Title 27, Division 2, Chapter 3, Subchapter 2, Article 4, Sections 20323 “CQA Plan” and 20324 “CQA Requirements”;
- Documenting and establishing health and safety procedures;
- Use industry standard demolition methods, which shall allow personnel to efficiently undertake demolition activities, minimizing the environmental safety exposures;
- Demolishing the aboveground structures (dismantling and removing of improvements and materials) in a phased approach while still using some items until the end of the project.
- Demolishing and removing of belowground facilities (underground utilities) as needed to meet the closure goals;
- Cleaning up of soils, if needed, to ensure that clean closure is achieved;
- Disposing of materials in appropriate facilities for treatment/disposal or recycling; and
- Re-contouring lines and grades to match the natural gradient and function.
- Evaluate the execution of the decommissioning and restoration plan through project oversight and quality assurance; and
- Document implementation of the plan and compliance with environmental requirements.

The Final Closure Plan will be for clean closure of the evaporation ponds, by completely removing all residue wastes, including sludges and liner materials and discharging them to an approved Unit, consistent with *CCR Title 27 Division 2 Subdivision 1, Chapter 3, Subchapter 5, Article 3, Section 21400*.

3.1 CLOSURE ACTIVITIES

The preliminary closure activities for the evaporation ponds include the following processes:

- Removal of Wastewater;
- Removal of Solids / sludge;
- Removal of hard surface / protective layer;

- Removal of high density polyethylene (HDPE) liners, drainage layers and leak detection system; then
- Site restoration.

Further information on each process is provided in the following sections. A preliminary estimate of quantities of materials removed and/or supplied is provided in **Section 4**, as a basis for the cost estimate.

3.1.1 WASTEWATER DISPOSAL/USE

Wastewater will be consolidated into one evaporation pond or until that one pond is full, as the minimum two feet of freeboard must be maintained. Wastewater remaining in the other evaporation ponds will be allowed to evaporate to the atmosphere. As long as liquids remain in the evaporation ponds, the monitoring and reporting requirements included in the permit requirements will be followed.

Genesis Solar LLC may obtain permission from the CRBRWQCB to use the consolidated wastewater for dust control during removal activities of the other two evaporation ponds. Any wastewater that is not evaporated or utilized for dust control (with prior CRBRWQCB approval only) will be characterized for off-site disposal then loaded into containers, handled, and transported by a licensed waste hauler to an approved disposal facility following all federal, state, and local requirements.

3.1.2 SOLIDS REMOVAL

Samples of the precipitated solids/sludge shall be collected from each evaporation pond for characterization in accordance with EPA SW-846 and the receiving facility requirements, and profiled for disposal. The characterized solids/sludge will then be loaded into containers and handled as appropriate by a licensed waste hauler and transported to an approved disposal facility, following all federal, state and local requirements.

3.1.3 HARD SURFACE/PROTECTIVE LAYER

The hard protective layer of roller compacted concrete or approved equivalent, will be removed using best engineering practices. Three samples of concrete will be collected from each evaporation pond to determine if the concrete can be recycled. If recyclable, the concrete will be crushed on site and transported to construction site(s) for use, such as road base material or used as backfill material at depths of greater than three feet below final grade. Handling and disposition of the material will abide by all federal, state and local requirements.

The granular fill beneath the hard surface protective layer will be removed. The material will be transported to an on-site facility to be washed. Water generated from the washing activities will

PRELIMINARY CLOSURE MAINTENANCE PLAN
FOR EVAPORATION PONDS
GENESIS SOLAR ENERGY PROJECT

be loaded in appropriate containers, handled, and transported by a licensed waste hauler to an approved disposal facility following all federal, state, and local requirements. The washed material will be reused on site as granular fill.

3.1.4 HDPE LINERS, DRAINAGE LAYERS AND MONITORING EQUIPMENT

In each evaporation pond, the HDPE liners, drainage layers and leak detection, collection and recovery sumps will be removed. The materials will be sent to a disposal facility. Handling and disposition of the material will abide by all federal, state and local requirements.

3.1.5 BASE LAYER

Confirmation sampling will be conducted on the clay layer of the evaporation pond liner system after the removal of the 40 mil HDPE geomembrane. If a GCL is used in the final design, the native materials below the GCL will be sampled after the removal of the overlying liner systems. Samples will be collected from each of the former pond footprints on 100-foot by 100-foot grid spacing. Laboratory analysis will include Title 22 metals, biphenyl, diphenyl oxide, and general chemistry.

3.1.6 SITE RESTORATION

The evaporation ponds will be backfilled with native soil to match the existing surrounding grade and restore drainage function. The berm surrounding each evaporation pond and the washed granular material will be the primary backfill material. The lime treated soil pad and berms from the onsite Land Treatment Unit (LTU) may be used as backfill in the evaporation ponds (if the LTU is also undergoing closure) at depths exceeding 3 feet below final grade. The upper 6 inches of soil will be decompacted as necessary and remediated to the accepted conditions.

3.2 CLOSURE SCHEDULE AND DATE

A closure schedule and final closure date will be determined at a future date and provided in the Final Closure Maintenance Plan.

It is assumed that closure would begin 30 years after the commercial operation date of the Project. It is also assumed that closure of the facility would occur in a phased sequential manner. Closure work would commence at the first pond, followed by similar work at the second pond, which would be followed by work on the third pond.

3.3 SITE SECURITY

As outlined in the RoWD/JTD, there will be existing security measures on site which restrict public access during operations, including closure of the evaporation ponds. The entire site will have chain-link security fencing around the site perimeter, switchyard and other areas requiring controlled access. Controlled access gates will be located at the entrances to the facility and access through the main gate will require an electronic swipe card, preventing unaccompanied visitors from accessing the Facility. All Facility personnel, contractors and visitors will be logged in and out of the Facility at the main office during normal business hours. Visitors and non-Genesis Solar LLC employees will be allowed entry only with approval from a staff member at the Facility.

In addition, at each point of access from a public road, an easily visible sign shall be posted indicating the facility name and other pertinent information as required by the Waste Discharge Requirements (WDR).

Removal of the site security will be undertaken as a separate process to the evaporation ponds, however will not occur until the evaporation ponds are completely closed and certified.

3.4 POST CLOSURE LAND USE

The land use of the closed evaporation pond after closure has not been determined. The area will be left as vacant, non-irrigated open land that has been remediated to the accepted conditions. Any future improvements will be permitted under separate process.

4. COST ANALYSIS

4.1 COST ESTIMATE

The preliminary cost estimates of undertaking the activities necessary to close the units are:

- 125MW Unit 1 ~ \$11,963,000
- 125MW Unit 2 ~ \$11,845,000

A breakdown of all the costs is provided in the Appendix A.

4.2 FINANCIAL RESPONSIBILITY

Under *CCR Title 27 Regulations, Division 2, Subdivision 1, Subchapter 4, Section 21780*, an updated demonstration of financial responsibility in accordance with Subchapter 2 of Chapter 6 (Section 22205 et seq) shall be provided.

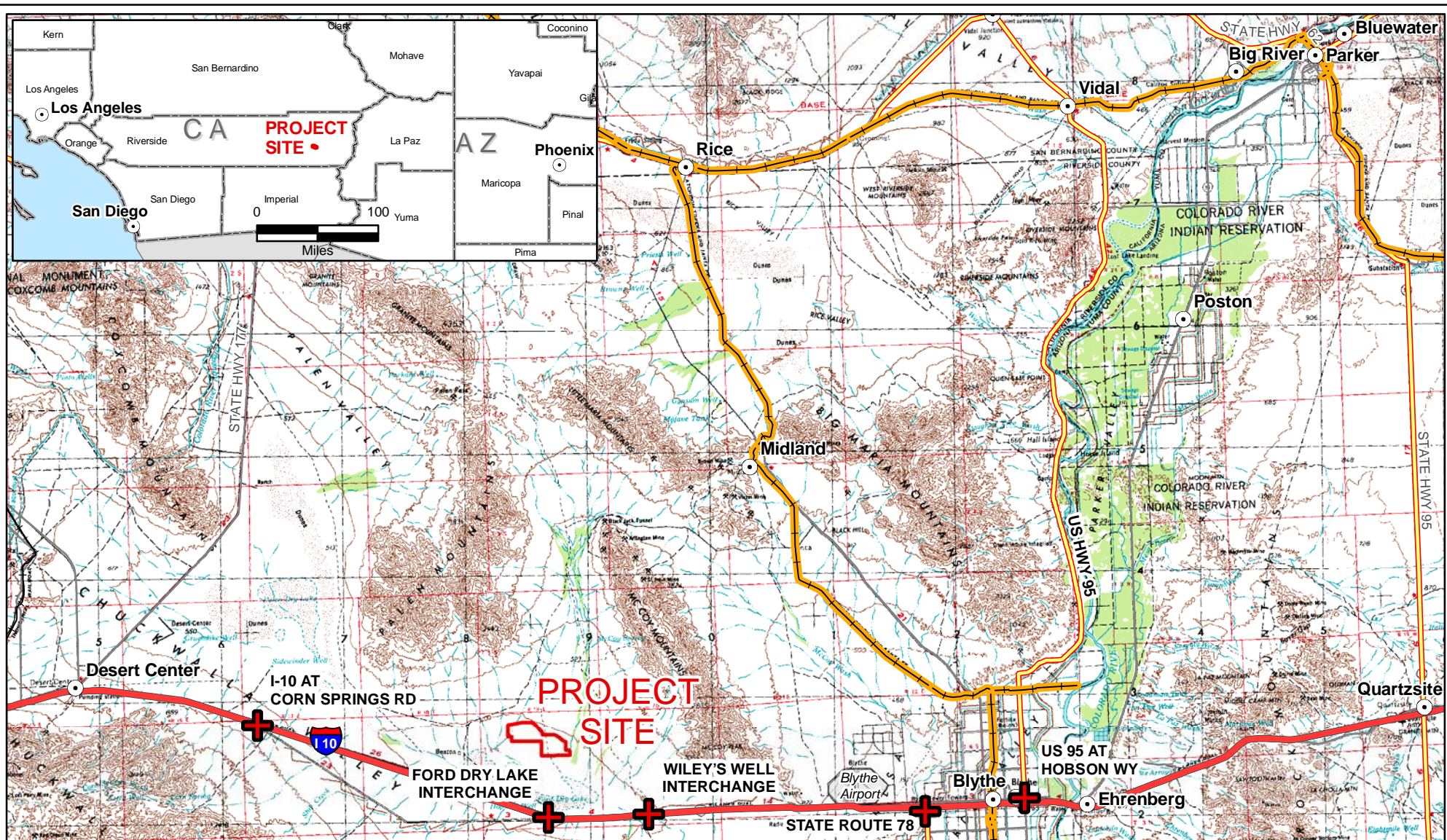
Section 22205 (Subchapter 2 of Chapter 6) requires operators of solid waste landfills to demonstrate the availability of financial resources to conduct closure activities. Evaporation ponds are classified as Class II surface impoundments and therefore this section is not applicable, however the financial responsibility for Class II surface impoundments are regulated under Section 22207:

At Class II and Class III Units for which the CIWMB does not require a closure fund, the RWQCB shall require the discharger to establish an irrevocable closure fund (or to provide other means) pursuant to the CIWMB-promulgated sections of this chapter but with the RWQCB named as beneficiary, to ensure closure of each classified Unit in accordance with an approved plan meeting all applicable SWRCB-promulgated requirements of this subdivision.

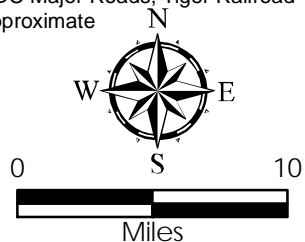
Genesis Solar LLC shall address this responsibility in coordination with the CRBRWQCB after the plans have been approved by the CRBRWQCB and other applicable regulatory agencies.

PRELIMINARY CLOSURE MAINTENANCE PLAN
FOR EVAPORATION PONDS
GENESIS SOLAR ENERGY PROJECT

FIGURES



SOURCE:
USGS 250K Quad Sheet, Salton Sea, Needles
ESRI Cities, SDC Major Roads, Tiger Railroad
All locations approximate



GENESIS SOLAR ENERGY PROJECT



WorleyParsons

resources & energy

SWL

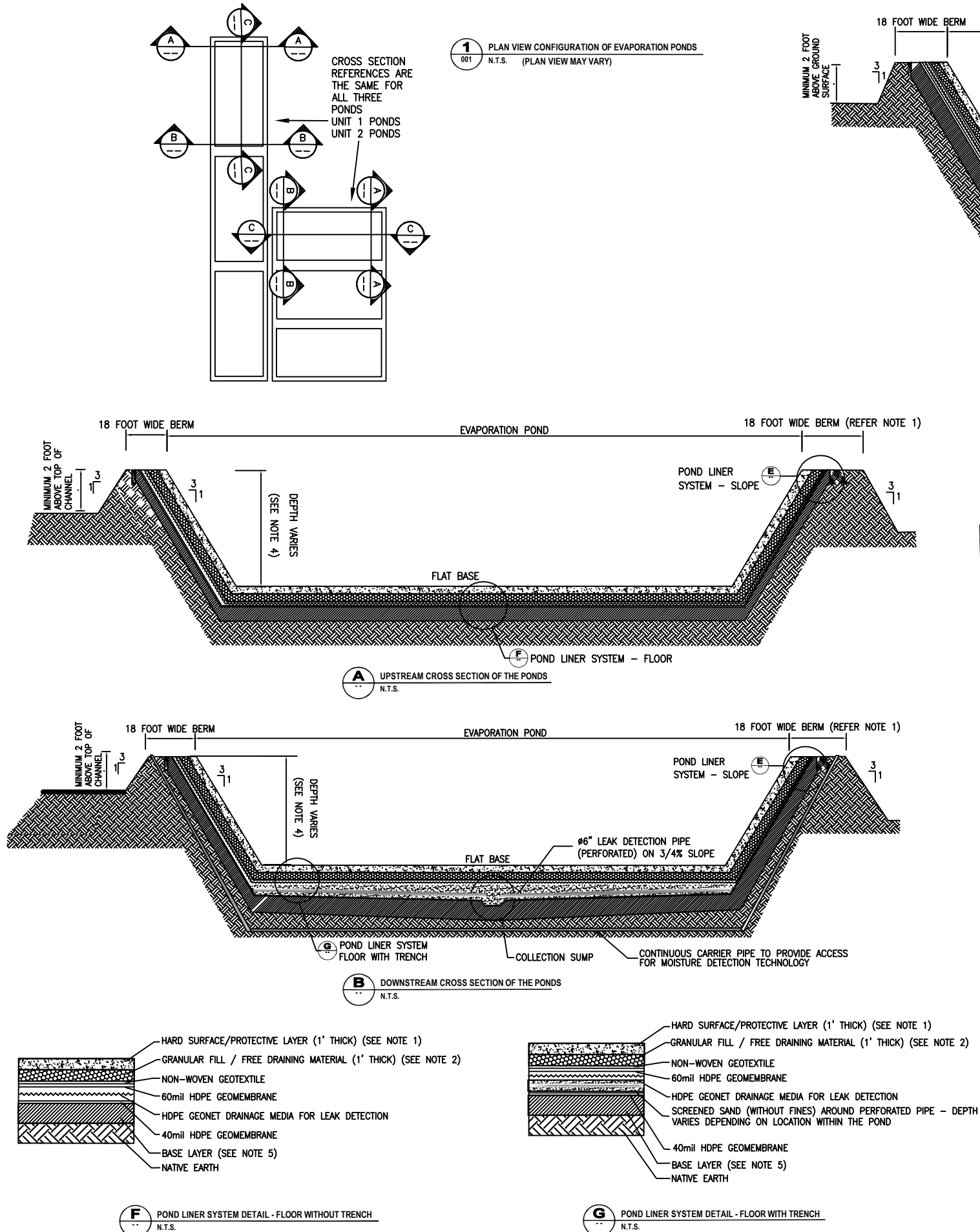
JM

7/2009



LOCATION MAP

52004617

1



- NOTE:
1. HARD SURFACE / PROTECTION LAYER TO BE 1 FOOT OF ROLLER COMPACTED CONCRETE OR APPROVED EQUIVALENT.
 2. GRANULAR FILL / FREE DRAINING SUB BASE MUST HAVE MAXIMUM PARTICLE SIZE OF 1/2".
 3. BERM IS A MINIMUM OF 12 FEET WIDE AND MAXIMUM OF 18 FEET WIDE. BERM COVERED BY A MINIMUM 6 INCHES OF ROADBASE MATERIAL.
 4. AVERAGE POND DEPTH OF 8 FEET ALLOWS FOR 2 FEET OF FREEBOARD, 3 FEET OF OPERATIONAL DEPTH AND 3 FEET OF SLUDGE ACCUMULATION. MINIMUM 1% SLOPE ACROSS POND BASE, THEREFORE UPSTREAM END OF THE POND WILL HAVE A DEPTH OF LESS THAN 8 FEET AND THE DOWNSTREAM END OF THE POND WILL HAVE A DEPTH OF MORE THAN 8 FEET.
 5. BASE LAYER: PREFERRED MATERIAL IS 2 FOOT OF ON SITE MATERIAL WITH A HYDRAULIC CONDUCTIVITY OF LESS THAN 1 X 10-6 CM/S, OF WHICH AT LEAST 30% OF THE MATERIAL SHALL PASS THROUGH A NO.200 U.S. STANDARD SIEVE. IF THIS MATERIAL IS NOT AVAILABLE, THE ALTERNATIVE DESIGN IS A GEOSYNTHETIC CLAY LINER (GCL).
 6. SEE TEXT FOR FURTHER DETAILS.

PRELIMINARY STATUS		DATE	REPRESENTS GENERAL DESIGN CONCEPTS. BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE			
APPROVED STATUS		DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE			
ORIGINATING PERSONNEL		PROFESSIONAL ENGINEER'S SEAL	
DRAWN BY		<div>PRELIMINARY NOT FOR CONSTRUCTION</div>	
CHECKED BY			
LEAD DESIGNER			
ENGINEER/TECH SPECIALIST			
PROJECT ENGINEERING MANAGER			
PROJECT MANAGER			
		LEADERSHIP No Incidents Safe Behavior	
		ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF P.E. _____ STATE: _____ LIC. NO.: _____ DATE: _____	
<div><div>WorleyParsons resources & energy</div></div>			
CLIENT/PROJECT TITLE			
GENESIS SOLAR, LLC			
GENESIS SOLAR ENERGY PROJECT			
EVAPORATION POND SECTION AND DETAILS			
SCALE		DRAWING SIZE	
N.T.S.		ARCH D (24" x 36")	
WORLEYPARSONS' DWG. NO.		REV	
FIGURE 3		A	



FAC

PIPING

I & C

ELECT

MECH

CIVIL

STRUC



FAC

PIPING

I & C

ELECT

MECH

CIVIL

STRUC



FAC

PIPING

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FAC

PIPING

I & C

ELECT

MECH

CIVIL

STRUC



FAC

PIPING

I & C

ELECT

MECH

CIVIL

STRUC

APPENDIX A: CLOSURE COSTS

EVAPORATION POND CLOSURE COST FOR UNIT 1- FOR 3 X 8 ACRE PONDS (24 ACRES)

(order of Magnitude Cost)

Sequence of Closure of Evaporation Ponds with Trench

1. Remove and Dispose Sludge (solid)
2. Remove, Crush , and Recycle Hard Surface (Roller compacted concrete without rebar)
3. Remove, Wash, and Reuse on site Granular Fill
4. Remove and Dispose of Non-Woven layer , 60 mil Geomembrane, and Geonet
5. Remove Screened Sand /piping trench ; reuse sand on site & dispose of piping
6. Remove and Dispose of 40 mil Geomembrane
7. Sample Clay/Silt layer to demonstrate that it is acceptable to leave in place
8. Return Granular Fill to interior of pond
9. Excavate Berms and return to interior of pond

	Unit	Unit Cost	Unit Quantity	No.	Sub Total
Costs					
1. Remove and Dispose Sludge (solid)					
Mobilization	LS	\$ 25,000	1	1	\$ 25,000
Excavate & Loading 7 years build up	CY	\$ 2.28	46,343	1	\$ 105,661
Hauling to Landfill (18 tons/truck & 60 mile RT)	mile	\$ 2.75	60	2,781	\$ 458,792
Disposal	ton	\$ 34.23	50,050	1	\$ 1,713,212
Sampling and RWQCB Report	each	\$ 25,000	1	1	\$ 25,000
				Total	\$ 2,327,664
2. Remove and Dispose/Recycle Hard Surface					
Mobilization	LS	\$ 10,000	1	1	\$ 10,000
Demolition of 12" Concrete	CY	\$ 100.50	39,045	1.0	\$ 3,924,056
Crush concrete on site	ton	\$ 4	79,067	1.0	\$ 316,267
Sampling of Crushed concrete demonstrating no impact	LS	\$ 25,000	1	1	\$ 25,000
Borrow, Load, Haul and Spread to on site stockpiles and dump, no compaction	ton	\$ 3.63	79,067	1	\$ 287,012
				Total	\$ 4,562,336
3. Remove, Wash, & Reuse Granular Fill					
Mobilization	LS	\$ 25,000	1	1	\$ 25,000
Excavate	CY	\$ 2.28	39,045	1	\$ 89,023
Borrow, Load, Haul and Spread to on site stockpiles and dump, no compaction	ton	\$ 3.63	52,711	1	\$ 191,342
Wash to remove salts	CY	\$ 5	39,045	1	\$ 195,227
Disposal of Wash Water	gal	\$ 0.50	780,907	1	\$ 390,453
Haul and Spread to on site stockpiles and dump, no compaction	ton	\$ 2.34	52,711	1	\$ 123,344
				Total	\$ 1,014,389
4. Remove and Dispose of Non-Woven layer , 60 mil Geomembrane, and Geonet					
Mobilization	LS	\$ 5,000	1	1	\$ 5,000
Removal of Non-Woven, HDPE	SY	\$ 0.60	117,136	1	\$ 70,282
Loading to trucks	CY	\$ 5.45	192	1	\$ 1,047
Hauling to Landfill (18 tons/truck & 60 mile RT)	mile	\$ 2.75	60	9	\$ 1,408
Disposal	ton	\$ 34.23	154	1	\$ 5,257
				Total	\$ 82,993
5. Remove Screened Sand /piping trench ; Sump					
Excavate	CY	\$ 2.28	267	1	\$ 608
Borrow, Load, Haul and Spread to on site stockpiles and dump, no compaction	ton	\$ 3.63	720,000	1	\$ 2,613,600
				Total	\$ 2,614,208

EVAPORATION POND CLOSURE COST FOR UNIT 1- FOR 3 X 8 ACRE PONDS (24 ACRES)**6. Remove and Dispose of 40 mil Geomembrane**

Mobilization	LS	\$	5,000	1	1	\$	5,000
Removal of HDPE	SY	\$	0.60	117,136	1	\$	70,282
Loading to trucks	CY	\$	5.43	128	1	\$	695
Hauling to Landfill (18 tons/truck & 60 mile RT)	mile	\$	2.75	60	6	\$	939
Disposal	ton	\$	34.23	102	1	\$	3,505
Total							\$ 80,420

7. Sample Clay/Silt layer to demonstrate that it is acceptable to leave in place

Sample Collection	Day	\$	1,800	5	1	\$	9,488
Sample Analysis	Each	\$	250	105	1	\$	26,356
Report of Analytical	Each	\$	7,500	1	1	\$	7,500
Total							\$ 43,344

8. Return Granular Fill to interior of pond

Mobilization	LS	\$	5,000	1	1	\$	5,000
Excavate	CY	\$	2.28	39,045	1	\$	89,023
Borrow, Load, Haul and Spread to on site stockpiles and dump, no compaction	ton	\$	3.63	52,711	1	\$	191,342
Total							\$ 285,365

9. Excavate Berms and return to interior of pond

Mobilization	LS	\$	10,000	1	1	\$	10,000
Excavate (Dozer, 300' haul, common earth)	CY	\$	2.28	89,772	1	\$	204,679
Total							\$ 214,679

Subtotal Field Activities Costs		\$ 11,225,399
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Contingency	(0% of All of the Above Costs)	\$ -
Total		\$ 11,225,399

Total Field Activities Costs	\$ 11,230,000
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Engineering and Oversight

Engineering	(1% of Total Construction Cost)	\$ 113,000
Permitting	(0.5% of Total Construction Cost)	\$ 57,000
Construction Management	(4.5% of Total Construction Cost)	\$ 506,000
Closure Report	(0.5% of Total Construction Cost)	\$ 57,000

Total Engineering and Oversight Cost	\$ 733,000
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TOTAL COST	\$ 11,963,000
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Notes

Unit Costs are from RS Means Building Construction Cost Data 2009, Standard Union, Riverside Region

EVAPORATION POND CLOSURE COST FOR UNIT 2 - FOR 3 X 8 ACRE PONDS (24 ACRES)

(order of Magnitude Cost)

Sequence of Closure of Evaporation Ponds with Trench

1. Remove and Dispose Sludge (solid)
2. Remove, Crush , and Recycle Hard Surface (Roller compacted concrete without rebar)
3. Remove, Wash, and Reuse on site Granular Fill
4. Remove and Dispose of Non-Woven layer , 60 mil Geomembrane, and Geonet
5. Remove Screened Sand /piping trench ; reuse sand on site & dispose of piping
6. Remove and Dispose of 40 mil Geomembrane
7. Sample Clay/Silt layer to demonstrate that it is acceptable to leave in place
8. Return Granular Fill to interior of pond
9. Excavate Berms and return to interior of pond

	Unit	Unit Cost	Unit Quantity	No.	Sub Total
Costs					
1. Remove and Dispose Sludge (solid)					
Mobilization	LS	\$ 25,000	1	1	\$ 25,000
Excavate & Loading 7 years build up	CY	\$ 2.28	46,343	1	\$ 105,661
Hauling to Landfill (18 tons/truck & 60 mile RT)	mile	\$ 2.75	60	2,781	\$ 458,792
Disposal	ton	\$ 34.23	50,050	1	\$ 1,713,212
Sampling and RWQCB Report	each	\$ 25,000	1	1	\$ 25,000
				Total	\$ 2,327,664
2. Remove and Dispose/Recycle Hard Surface					
Mobilization	LS	\$ 10,000	1	1	\$ 10,000
Demolition of 12" Concrete	CYD	\$ 100.50	39,045	1.0	\$ 3,924,056
Crush concrete on site	ton	\$ 4	79,067	1.0	\$ 316,267
Sampling of Crushed concrete demonstrating no impact	LS	\$ 25,000	1	1	\$ 25,000
Borrow, Load, Haul and Spread to on site stockpiles and dump, no compaction	ton	\$ 3.63	79,067	1	\$ 287,012
				Total	\$ 4,562,336
3. Remove, Wash, & Reuse Granular Fill					
Mobilization	LS	\$ 25,000	1	1	\$ 25,000
Excavate	CY	\$ 2.28	39,045	1	\$ 89,023
Borrow, Load, Haul and Spread to on site stockpiles and dump, no compaction	ton	\$ 3.63	52,711	1	\$ 191,342
Wash to remove salts	CYD	\$ 5	39,045	1	\$ 195,227
Disposal of Wash Water	gal	\$ 0.50	780,907	1	\$ 390,453
Haul and Spread to on site stockpiles and dump, no compaction	ton	\$ 2.34	52,711	1	\$ 123,344
				Total	\$ 1,014,389
4. Remove and Dispose of Non-Woven layer , 60 mil Geomembrane, and Geonet					
Mobilization	LS	\$ 5,000	1	1	\$ 5,000
Removal of Non-Woven, HDPE	SY	\$ 0.60	117,136	1	\$ 70,282
Loading to trucks	CY	\$ 5.45	192	1	\$ 1,047
Hauling to Landfill (18 tons/truck & 60 mile RT)	mile	\$ 2.75	60	9	\$ 1,408
Disposal	ton	\$ 34.23	154	1	\$ 5,257
				Total	\$ 82,993
5. Remove Screened Sand /piping trench ; Sump					
Excavate	CY	\$ 2.28	267	1	\$ 608
Borrow, Load, Haul and Spread to on site stockpiles and dump, no compaction	ton	\$ 3.63	720,000	1	\$ 2,613,600
				Total	\$ 2,614,208

EVAPORATION POND CLOSURE COST FOR UNIT 2 - FOR 3 X 8 ACRE PONDS (24 ACRES)

6. Remove and Dispose of 40 mil Geomembrane

Mobilization	LS	\$	5,000	1	1	\$	5,000
Removal of HDPE	SY	\$	0.60	117,136	1	\$	70,282
Loading to trucks	CY	\$	5.43	128	1	\$	695
Hauling to Landfill (18 tons/truck & 60 mile RT)	mile	\$	2.75	60	6	\$	939
Disposal	ton	\$	34.23	102	1	\$	3,505
Total							\$ 80,420

7. Sample Clay/Silt layer to demonstrate that it is acceptable to leave in place

Sample Collection	Day	\$	1,800	5	1	\$	9,488
Sample Analysis	Each	\$	250	105	1	\$	26,356
Report of Analytical	Each	\$	7,500	1	1	\$	7,500
Total							\$ 43,344

8. Return Granular Fill to interior of pond

Mobilization	LS	\$	5,000	1	1	\$	5,000
Excavate	CY	\$	2.28	39,045	1	\$	89,023
Borrow, Load, Haul and Spread to on site stockpiles and dump, no compaction	ton	\$	3.63	52,711	1	\$	191,342
Total							\$ 285,365

9. Excavate Berms and return to interior of pond

Mobilization	LS	\$	10,000	1	1	\$	10,000
Excavate (Dozer, 300' haul, common earth)	CY	\$	2.28	41,642	1	\$	94,945
Total							\$ 104,945

Subtotal Field Activities Costs		\$ 11,115,664
--	--	----------------------

Contingency	(0% of All of the Above Costs)	\$ -
Total		\$ 11,115,664

Total Field Activities Costs	\$ 11,120,000
-------------------------------------	----------------------

Engineering and Oversight

Engineering	(1% of Total Construction Cost)	\$ 112,000
Permitting	(0.5% of Total Construction Cost)	\$ 56,000
Construction Management	(4.5% of Total Construction Cost)	\$ 501,000
Closure Report	(0.5% of Total Construction Cost)	\$ 56,000

Total Engineering and Oversight Cost	\$ 725,000
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TOTAL COST	\$ 11,845,000
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Notes

Unit Costs are from RS Means Building Construction Cost Data 2009, Standard Union, Riverside Region

**APPENDIX F: PRELIMINARY CLOSURE PLAN FOR
LAND TREATMENT UNIT**

GENESIS SOLAR ENERGY PROJECT

PRELIMINARY CLOSURE MAINTENANCE PLAN FOR THE LAND TREATMENT UNIT

Submitted to:

California Regional Water Quality Control Board
Colorado River Basin Region

Submitted by:

Genesis Solar, LLC

With technical assistance from:

WorleyParsons Group, Inc.

August 2009

PRELIMINARY CLOSURE MAINTENANCE PLAN
FOR LAND TREATMENT UNIT
GENESIS SOLAR ENERGY PROJECT

Prepared By:

Janine Forrest

Date

Reviewed By:

Bob Anders, California Registered Professional Engineer, as an employee of WorleyParsons, with expertise in civil engineering, has reviewed the report with the title "Preliminary Closure Maintenance Plan for the Land Treatment Unit". His signature and stamp appear below.

Bob Anders, PE

Date

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FIGURE 2: SITE LAYOUT PLAN

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APPENDIX A: CLOSURE COSTS

1. INTRODUCTION

This report presents a Preliminary Closure Maintenance Plan for the Land Treatment Unit (LTU) for the proposed Genesis Solar Energy Project ("Project"), located in the Colorado Desert between the communities of Blythe, CA (approximately 24 miles east) and Desert Center, CA (approximately 27 miles west).

Genesis Solar, LLC, is proposing to construct, own and operate the Project on an approximate 1,800-acre site near Ford Dry Lake in Riverside County, California (refer **Figure 1**). The Project is a concentrated solar power (CSP) electric generating facility that will use a proven parabolic trough solar thermal technology. The troughs will concentrate the sun's heat on tubes carrying a petroleum-based Heat Transfer Fluid (HTF) that will be used for steam production. The steam in turn will be used to power a steam turbine generator. The LTU will receive, temporarily store and treat soil that has been impacted by occasional leaks and spills of HTF.

This Preliminary Closure Maintenance Plan is specific to the LTU associated with the Project.

1.1 PURPOSE

This Preliminary Closure Maintenance Plan for the LTU is intended to be a stand alone separable document to the application for Report of Waste Discharge (RoWD) / Joint Technical Document (JTD) for the Project, in accordance with the *California Integrated Waste Management Board (CIWMB) Title 27 Regulations, Division 2, Subdivision 1*, requirements for closure (refer **Section 1.2**).

1.2 REGULATORY REQUIREMENTS

There are references to Closure Maintenance Plans for LTU's in the following sections of *California Code of Regulations (CCR) Title 27 Environmental Protection, Division 2 Solid Waste, Subdivision 1*:

- *Chapter 3, Subchapter 5, Article 1, Section 20950* – General Closure and Post Closure Maintenance States: Outlines Final Closure Maintenance Plan requirements including closure supervision, surveying monuments, vegetation and financial assurance. The goal of closure for LTU's is to initiate the post-closure maintenance periods;
- *Chapter 3, Subchapter 5, Article 3, Section 21420* – Closure Requirements for Land Treatment Units (LTUs): Outlines operational and compliance monitoring requirements;
- *Chapter 4, Subchapter 1, Article 2 Section 21570* – CIWMB Filing Requirements: Outlines completeness requirements for Preliminary or Final Closure Maintenance Plans;

PRELIMINARY CLOSURE MAINTENANCE PLAN
FOR LAND TREATMENT UNIT
GENESIS SOLAR ENERGY PROJECT

- *Chapter 4, Subchapter 3, Article 4 Section 21750(i)* – Preliminary Closure Plan: Identifies the difference between Preliminary and Final Closure Maintenance Plans. In summary, a preliminary closure maintenance plan shall contain a generalized cost estimate for closure costs supported in sufficient detail to validate a plausibility of the estimate. For any Unit undergoing complete final closure of any portion of the Unit, the RoWD shall be amended to contain a Final Closure Maintenance Plan; and
- *Chapter 4, Subchapter 4, Section 21769 to 21900* – Outlines submittal requirements for Preliminary and Final Closure Maintenance Plans including cost analysis, financial assurance, closure schedule, final treatment procedures, and plan review.

1.3 OBJECTIVES

The objective of this plan is to meet the regulatory requirements for Preliminary Closure Maintenance Plan for a LTU. The procedures described in this Preliminary Closure Maintenance Plan are designed to protect public health and safety and the environment.

A Final Closure Maintenance Plan will be submitted to the Colorado River Basin 7, Regional Water Quality Control Board (CRBRWQCB) as an amendment to the RoWD/JTD before undergoing complete final closure of any portion of the LTU. In the Final Closure Maintenance Plan, the regulatory requirements listed in **Section 1.2** plus any revised applicable regulatory requirements shall be addressed. After the LTU has been closed, a Certification of Closure will be submitted for approval to the CRBRWQCB to ensure the LTU has been closed in accordance with the approved Final Closure Maintenance Plan.

The project goals for closure of the LTU are as follows:

- Remove all improvements within 3 feet of final grade; and
- Restore the lines and grades in the disturbed area of the LTU area to match the natural gradients.

2. LAND TREATMENT UNIT DESIGN

The LTU will be 10 acres, constructed with a prepared base consisting of 2 feet of compacted, low permeability, lime-treated material. This LTU will cater for both 125MW units on the Project site. This base will serve as a competent platform for land farming activities, and will serve to slow the rate of surface water infiltration in the treatment area. The compacted and native soil beneath the LTU is designated as a “treatment zone” to a depth of 5 feet.

The LTU will not incorporate a liner containment system or leak detection and removal system. Although the LTU will be taking vehicle traffic, no hard surface will be required, as there is no liner system to protect. A staging area is allocated in the LTU for storage of HTF-impacted soils while they are being characterized. Soil characterized as hazardous will be removed from the site; therefore, no additional liner system is required in the LTU to cater for the hazardous waste.

The LTU will be surrounded on all sides by a minimum 2-foot high compacted earthen berm with side slopes of approximately 3:1 (horizontal: vertical). These berms will control and prevent potential inflow (run-on) of surface storm water into the LTU or runoff of stormwater from the LTU.

The proposed location and design for LTU are provided in the following figures:

- **Figure 2:** Site Layout Plan
- **Figure 3:** Land Treatment Unit Section and Details

3. CLOSURE STRATEGY

The Final Closure Maintenance Plan will outline in detail how each major task will be performed, however the overall closure strategy shall contain the following major elements:

- Conducting pre-closure activities, such as final closure and restoration planning, that addresses the “as-found” site conditions at the start of the Project;
- Prepare a Construction Quality Assurance (CQA) Plan, certified by an appropriately registered professional to satisfy the requirements of CCR Title 27, Division 2, Chapter 3, Subchapter 2, Article 4, Sections 20323 “CQA Plan” and 20324 “CQA Requirements”;
- Documenting and establishing health and safety procedures;
- Use industry standard demolition methods, which shall allow personnel to efficiently undertake demolition activities, minimizing the environmental safety exposures;
- Demolishing the aboveground structures (dismantling and removing of improvements and materials) in a phased approach while still using some items until the end of the Project;
- Demolishing and removing of belowground facilities (underground utilities) as needed to meet the closure goals;
- Cleaning up of soils, if needed, to ensure that clean closure is achieved;
- Disposing of materials in appropriate facilities for treatment/disposal or recycling; and
- Re-contouring lines and grades to match the natural gradient and function.
- Evaluate the execution of the decommissioning and restoration plan through project oversight and quality assurance; and
- Document implementation of the plan and compliance with environmental requirements.

The Final Closure Plan will be for clean closure of the LTU, by completely removing all residue wastes, and discharging them to an approved Unit.

3.1 CLOSURE ACTIVITIES

The preliminary closure activities for the LTU include the following processes:

- Soil Segregation; then
- Site Restoration.

PRELIMINARY CLOSURE MAINTENANCE PLAN
FOR LAND TREATMENT UNIT
GENESIS SOLAR ENERGY PROJECT

Further information on each process is provided in the following sections. A preliminary estimate of quantities of materials removed and/or supplied is provided in **Section 4**, as a basis for the cost estimate.

3.1.1 SOIL SEGREGATION

If contaminated soil remains in the LTU when its time to close the LTU, the concentrations of HTF will vary depending on the length of time the soil has been in the LTU. To ensure proper handling and disposal, representative soil samples will be collected in the LTU to determine HTF concentrations. Soil shall be segregated based on the following criteria:

- For concentrations below 100 milligrams per kilograms (mg/kg) of HTF, the soil will be used as back fill material on site.
- For concentrations of HTF below hazardous material classification but above 100 mg/kg, the soil will be stored and treated in the LTU until concentrations are below 100 mg/kg of HTF.
- Although not expected, any soil classified as a hazardous material will be collected and containerized pending disposal at a Class I waste disposal facility.

The LTU soils will continue to be managed, maintained, monitored, and reported as required under the Waste Discharge Requirements (WDRs) from the CRBRWQCB. Once soil concentrations are below 100 mg/kg, the soil will be used as fill material on the property.

3.1.2 SITE RESTORATION

The LTU uses native soil only, therefore no demolition is required. Sampling will be conducted in the compacted lime-treated native materials on 100-foot by 100-foot grid spacing. Laboratory analysis will include total petroleum hydrocarbons, Title 22 metals, biphenyl, diphenyl oxide, and general chemistry.

The lime treated soil pad and berms shall be removed and may be used as backfill in the evaporation ponds (if also undergoing closure) on site at depths exceeding 3 feet below final grade, if appropriate after the results of the sampling. The LTU will be backfilled with compacted native soil to match the existing surrounding grade and restore drainage function. The upper 6 inches of soil will be decompacted as necessary and remediated to the accepted conditions.

3.2 CLOSURE SCHEDULE AND DATE

A closure schedule and final closure date will be determined at a future date and provided in the Final Closure Maintenance Plan.

It is assumed that closure would begin 30 years after the commercial operation date of the Project.

3.3 SITE SECURITY

As outlined in the RoWD/JTD, there will be existing security measures on site which restrict public access during operations, including closure of the LTU. The entire site will have chain-link security fencing around the site perimeter, switchyard and other areas requiring controlled access. Controlled access gates will be located at the entrances to the facility and access through the main gate will require an electronic swipe card, preventing unaccompanied visitors from accessing the Facility. All Facility personnel, contractors and visitors will be logged in and out of the Facility at the main office during normal business hours. Visitors and non-Genesis Solar LLC employees will be allowed entry only with approval from a staff member at the Facility.

In addition, at each point of access from a public road, an easily visible sign shall be posted indicating the facility name and other pertinent information as required by the WDR.

Removal of the site security will be undertaken as a separate process to the LTU, however will not occur until the LTU is completely closed and certified.

3.4 POST CLOSURE LAND USE

The land use of the closed LTU after closure has not been determined. The area will be left as vacant, non-irrigated open land that has been remediated to the accepted conditions. Any future improvements will be permitted under separate process.

4. COST ANALYSIS

4.1 COST ESTIMATE

The preliminary cost estimate of carrying out all the activities necessary to close the unit is \$237,000. A breakdown of all the costs is provided in **Appendix A**.

4.2 FINANCIAL RESPONSIBILITY

Under *CCR Title 27 Regulations, Division 2, Subdivision 1, Subchapter 4, Section 21780*, an updated demonstration of financial responsibility in accordance with Subchapter 2 of Chapter 6 (Section 22205 et seq) shall be provided.

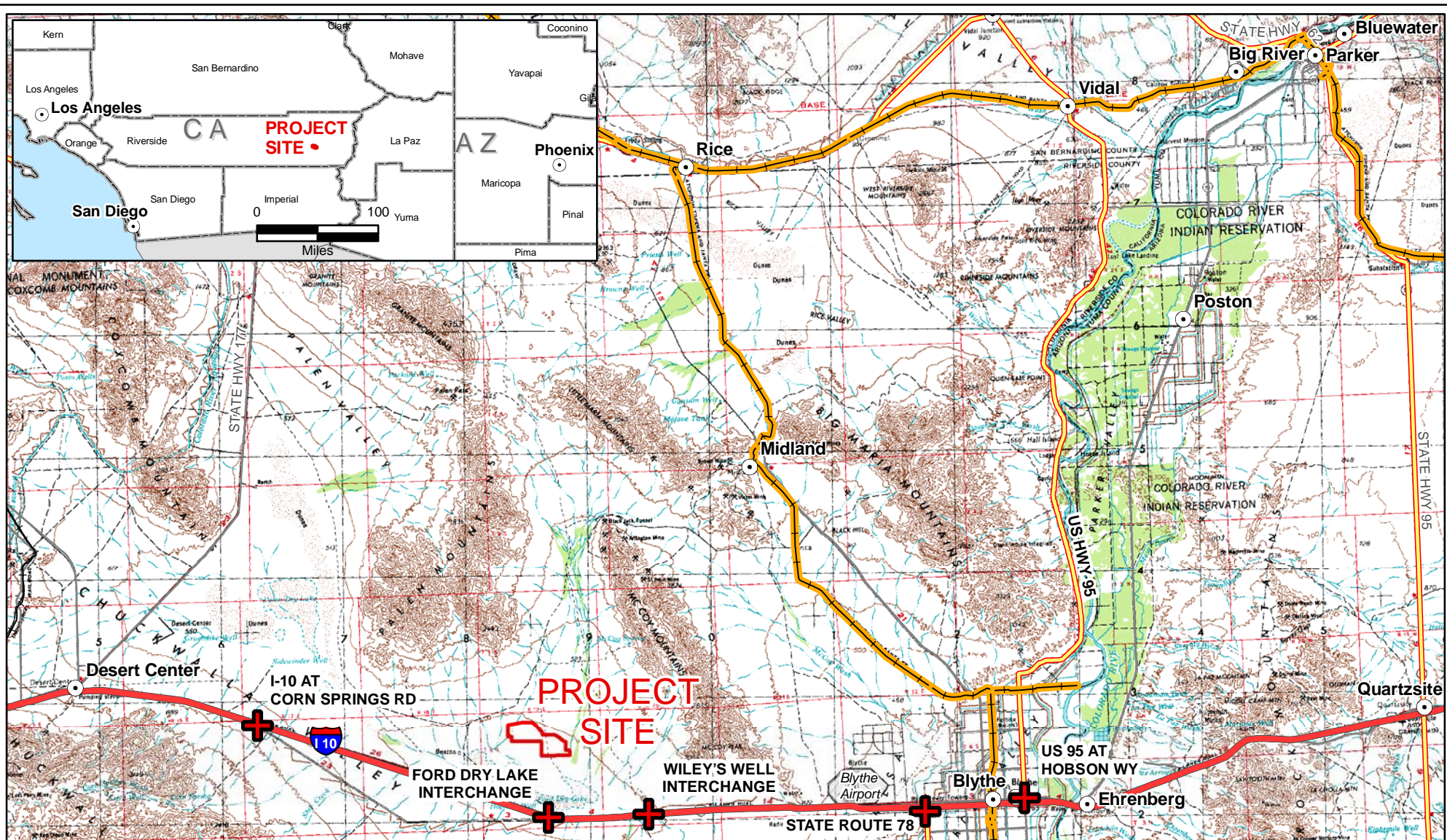
Section 22205 (Subchapter 2 of Chapter 6) requires operators of solid waste landfills to demonstrate the availability of financial resources to conduct closure activities. LTU's are classified as Class II waste management units and therefore this section is not applicable, however the financial responsibilities for Class II waste management units are regulated under Section 22207:

At Class II and Class III Units for which the CIWMB does not require a closure fund, the RWQCB shall require the discharger to establish an irrevocable closure fund (or to provide other means) pursuant to the CIWMB-promulgated sections of this chapter but with the RWQCB named as beneficiary, to ensure closure of each classified Unit in accordance with an approved plan meeting all applicable SWRCB-promulgated requirements of this subdivision.

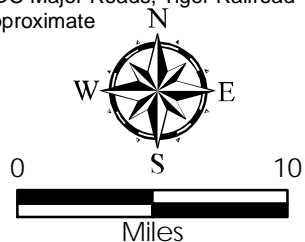
Genesis Solar LLC shall address this responsibility in coordination with the CRBRWQCB after the plans have been approved by the CRBRWQCB and other applicable regulatory agencies.

PRELIMINARY CLOSURE MAINTENANCE PLAN
FOR LAND TREATMENT UNIT
GENESIS SOLAR ENERGY PROJECT

FIGURES



SOURCE:
USGS 250K Quad Sheet, Salton Sea, Needles
ESRI Cities, SDC Major Roads, Tiger Railroad
All locations approximate



GENESIS SOLAR ENERGY PROJECT



WorleyParsons

resources & energy

LOCATION MAP

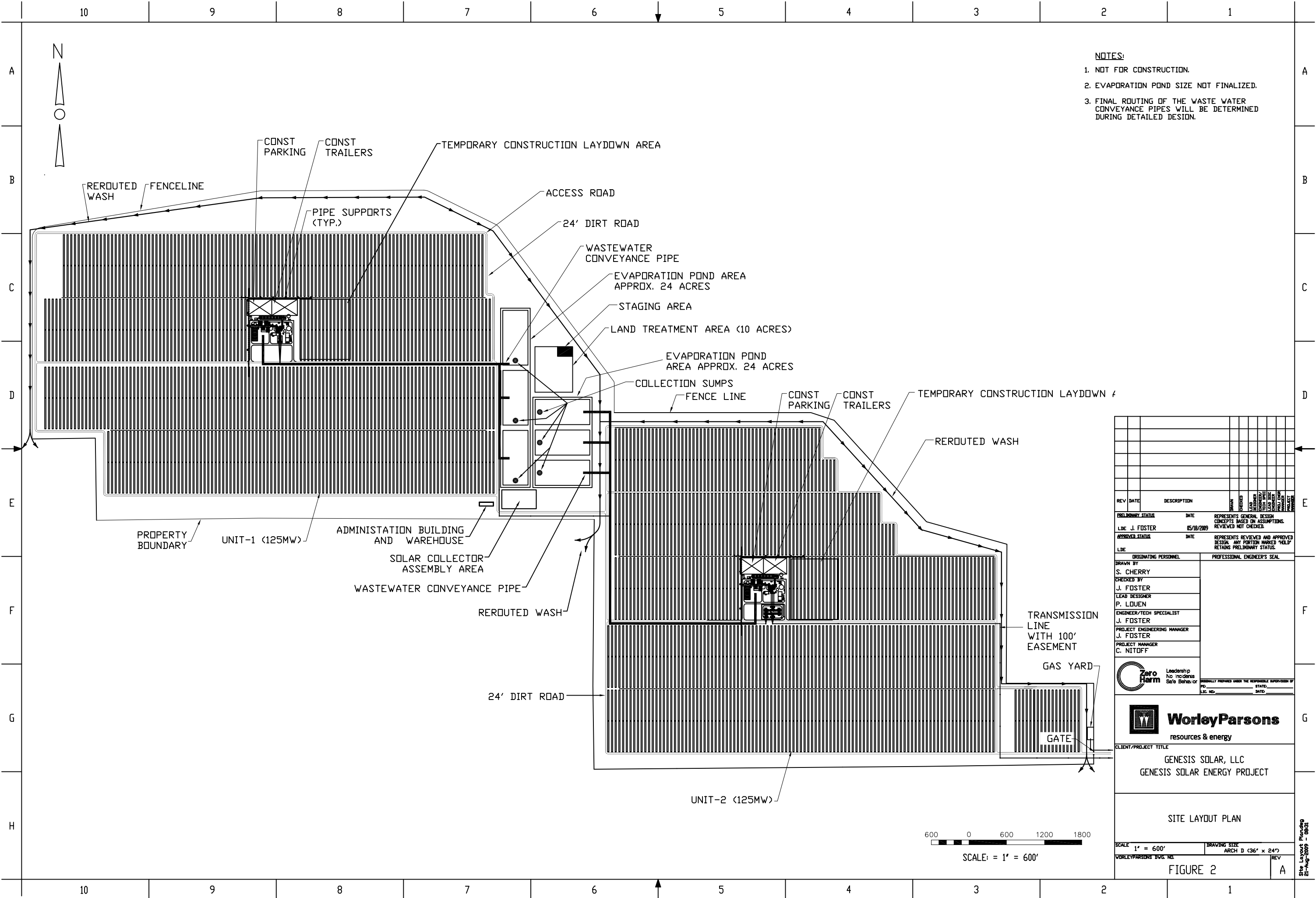
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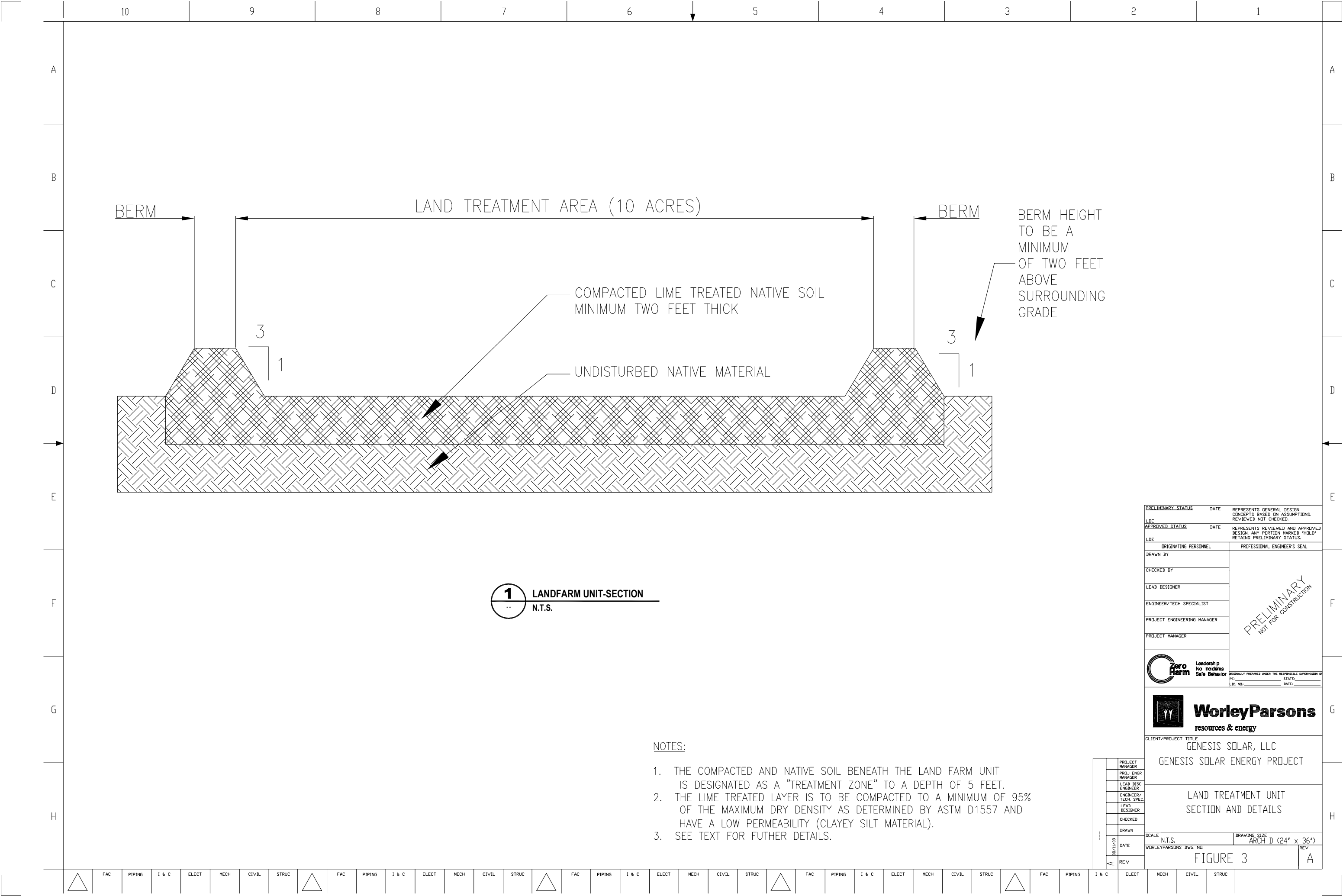
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- NOTES:**
1. NOT FOR CONSTRUCTION.
 2. EVAPORATION POND SIZE NOT FINALIZED.
 3. FINAL ROUTING OF THE WASTE WATER CONVEYANCE PIPES WILL BE DETERMINED DURING DETAILED DESIGN.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	IN CHARGE	DESIGNED	ENGINEER	PROJECT
PRELIMINARY STATUS		DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.					
LDE J. FOSTER		05/18/2009						
APPROVAL STATUS		DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.					
LDE								
ORIGINATING PERSONNEL			PROFESSIONAL ENGINEER'S SEAL					
DRAWN BY								
S. CHERRY								
CHECKED BY								
J. FOSTER								
LEAD DESIGNER								
P. LOUEN								
ENGINEER/TECH SPECIALIST								
J. FOSTER								
PROJECT ENGINEERING MANAGER								
J. FOSTER								
PROJECT MANAGER								
C. NITOFF								
			Leadership No Incidents Safe Behavior					
			DESIGNED BY: _____ DATE: _____					
			LDC NO: _____ DATE: _____					
			resources & energy					
CLIENT/PROJECT TITLE								
GENESIS SOLAR, LLC								
GENESIS SOLAR ENERGY PROJECT								
SITE LAYOUT PLAN								
SCALE 1" = 600'			DRAWING SIZE ARCH D (36" x 24")			REV		
WORLEYPARSONS DIVISION								
FIGURE 2						A		

Site Layout Plan
E-10000000 - 0001



APPENDIX A: CLOSURE COSTS

LAND TREATMENT UNIT CLOSURE COST FOR BOTH 125 MW UNITS - 10 ACRES
(order of Magnitude Cost)

Activities sequence to close Land Treatment Unit (LTU)

1. Sample treated soil within the LTU to demonstrate it is acceptable to use soil as fill material
2. Demo berms and return to interior of LTU
3. Sample Clay/Silt layer to demonstrate that it is acceptable to leave in place

	Unit	Unit Cost	Unit Quantity	No.	Sub Total
Costs					
1. Sample treated soil to demonstrate it is acceptable to use soil as fill material					
Sample Collection	Day	\$	1,800	17	1 \$ 31,320
Sample Analysis (1 ft & 5 ft)	Each	\$	250	348	1 \$ 87,000
Report of Analytical	Each	\$	10,000	1	1 \$ 10,000
				Total	\$ 128,320
2. Demo berms and return to interior of LTU					
Mobilization	LS	\$	5,000	1	1 \$ 5,000
Excavate (Dozer, 300' haul, common earth)	CY	\$	2.28	4,711	1 \$ 10,741
				Total	\$ 15,741
3. Sample Clay/Silt layer of pad to demonstrate that it is acceptable to leave in place					
Sample Collection	Day	\$	1,800	9	1 \$ 15,660
Sample Analysis	Each	\$	250	174	1 \$ 43,500
Report of Analytical	Each	\$	10,000	1	1 \$ 10,000
				Total	\$ 69,160
Subtotal Field Activities Costs					\$ 213,221
Contingency (0% of All of the Above Costs)					\$ -
				Total	\$ 213,221
Total Field Activities Costs					\$ 220,000
Engineering and Oversight					
Engineering	(1% of Total Construction Cost)				\$ 3,000
Permitting	(0.5% of Total Construction Cost)				\$ 2,000
Construction Management	(4.5% of Total Construction Cost)				\$ 10,000
Closure Report	(0.5% of Total Construction Cost)				\$ 2,000
Total Engineering and Oversight Cost					\$ 17,000
TOTAL COST					\$ 237,000

Notes

Unit Costs are from RS Means Building Construction Cost Data 2009, Standard Union, Riverside Region

APPENDIX G: FINANCIAL ASSURANCE

Will be provided to CRBRWQCB